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Indexed in the Industrial Arts Index.
Published every Thursday. Subscription
Price: United States and Pos-
sessions, Mexico, Cuba, \$6.00; Can-
ada, \$8.50; Foreign, \$12.00 a year.
Single copy, 25 cents. Annual Num-
ber \$1.00. Cable Address, "Ironage,
N. Y."



Owned and Published by
CHILTON COMPANY
(Incorporated)



Publication Office Editorial and
Chestnut and 56th Sts., Executive Offices
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THE IRON AGE

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MARCH 28, 1940

ESTABLISHED 1855

Vol. 145, No. 13

The Bill to Pay All Bills

LAST week we published the details of a bill introduced by Senator O'Mahoney of Wyoming, who as head of the TNEC is holding a coroner's inquest on the remains of the American System of Enterprise. Evidently the good Senator believes that there is still some life in that body, for he has offered, legislatively, a resuscitant devised by Karl Karsten which the author claims will abolish unemployment, balance the budget, stop the increase in national debt, make tax income exceed Government outgo, reconcile the machine to society and vice-versa and otherwise bring on an economic millenium.

The author of this fascinating conjecture, who was formerly an economist with the WPA, has devised a beautifully painless method of introducing the needle. It consists in the statement that every employer of labor will receive a tax rebate, allowance or deduction, depending upon the size of his payroll. Later on in the bill crops up the fact that the funds for this rebate will be collected by passing the hat also to employers in the form of a "collection" (the word tax is avoided nowadays), this being figured upon gross income after subtracting materials bought from suppliers and the payroll. The basis of this collection is therefore a crude approximation of the Department of Commerce's "value added by manufacture."

In this assumption of the base for taxing, Karl Karsten goes Karl Marx one better, for he permits no recognition of interest on investment and depreciation. Thus the steel industry, with investment in equipment and plant of \$10,000 per employee or more, would receive no more credit for this item of cost than the artificial flower industry with an investment of perhaps \$50 per person.

The idea back of this bill is that the highly mechanized and more efficient industries will receive a tax reduction that will be much less than the tax payment they will be called upon to make; whereas the handicraft industries, where labor bears a higher ratio to "added value" will actually get a direct hand-out. This is regarded as the necessary stimulant to employing lots of people in these industries.

A study of the ratio of the number of wage earners employed in various industries to the value added by manufacture in 1937 shows printing and publishing at the head of the list, with a ratio of 1 to 5.55; food and kindred products, with a ratio of 1 to 3.78; the steel industry with 1 to 2.9, and textiles with 1 to 1.64. Certainly this wide discrepancy seems to bear no relationship to mechanization and certainly it bears no relationship to net profits.

Any tax program based upon this principle, or rather lack of it, is unsafe and unsound. It is merely a scheme whereby marginal industries and concerns would "share the profits" of the more efficient concerns and industries, at public cost.

Tax reductions would stimulate employment, it is true. But this is not a tax reduction but merely the shuffling of a new deck of taxes. Let Government reduce its expenses and its taxes and you will see more and better employment. But that method is the hard way and would require the use of the pruning knife in Washington. It requires less effort and discomfort to cut the business man's ears off with it.





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ROLLING

of SHEET AND STRIP...

By GEORGE SACHS

Case School of Applied Science,
Cleveland

THE different types of rolling mills for hot and cold reducing of steel, the roll finish, and the metal problems involved, are all treated in detail herein by the author, in this first section of a two-

part article. Much of the data was first presented at the recent symposium on the cold working of metal, sponsored by the Department of Metallurgy, Carnegie Institute of Technology, Pittsburgh.

apparent that the use of large working rolls appreciably increases the power requirements. Oil is often used to decrease the friction between the rolls and the stock. The same objective can be accomplished by one or two small working rolls. However, these rolls have to be provided with special backing rolls to compensate for the loss in strength, if the stock has a width of more than about $1\frac{1}{2}$ times the diameter of the rolls, in the cold rolling of strong metals. In hot rolling and in the rolling of soft metals, smaller rolls without backing can more readily be used.

The advantages of small working

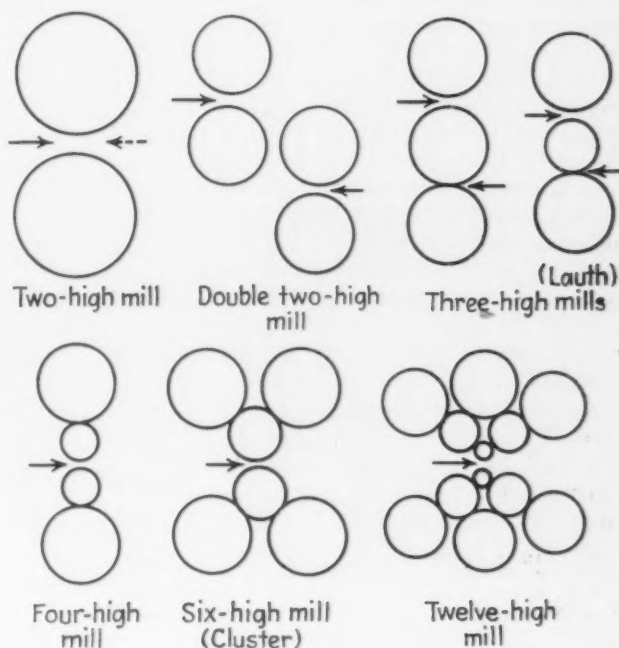
THE general term rolling is used to describe various processes which work metal by means of rolls. The most important rolling operations are those in which ingots are transformed to semi-finished and finished products, such as sheet, strip, rods, shapes and tubes. In these operations the metal is subjected to a compression between two rolls, and the rotation of the rolls serves continuously to advance the metal.

Rolls with flat surfaces are used for working flat stock. The different types of such rolling mills are illustrated in Fig. 1. The simplest and most extensively used types is the "two-high mill" or "duo-mill," consisting of two rolls of approximately the same size, arranged parallel in a vertical stand. The rolls are usually rotated only in one direction, and stock of large dimensions is returned to the entrance or back side of the rolls by means of platforms that can be raised above the rolls. Generally both rolls are operated at a uniform surface speed. Otherwise, the metal bends upwards (overdraft) or downwards (underdraft). Reversible two-high mills, which eliminate transporting the stock over the mill, also are used. This problem is

solved likewise by a "double two-high mill," consisting of two mills arranged in a single stand and rotating in different directions; or a "three-high mill," which is composed of a center roll and two exterior rolls.

In these types of rolling mills, it is

FIG. 1—These different types of mills are used for the rolling of sheet and strip.



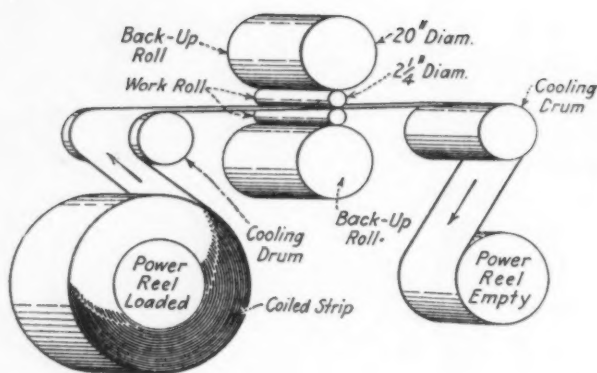


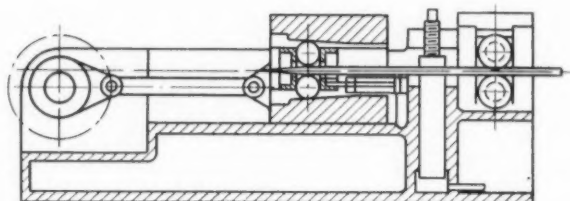
FIG. 2—Four-high Steckel cold rolling mill with tension reels.

rolls have occasioned the development of "four-high" mills and "six-high" or "cluster mills," which have two small working rolls and two or four larger backing rolls respectively. Either the working rolls or one or both backing rolls are driven. The four-high mill is preferred at present because of its lower cost, convenience and the ease of adjustment. However, the advantages of small working rolls can be completely realized only in the fabrication of strip stock. Small rolls are not suitable for the commercial cold rolling of sheet, because they do not permit heavy reductions of thicker metal and do not produce as flat stock as do large rolls.

These disadvantages can be overcome only in the rolling of long lengths, that is strip, with the assistance of powerful "take up reels" or "power reels" in front of the rolls (Fig. 2). The coils may be welded together continuously by means of gas or electricity to eliminate the tedious entering and adjusting procedure. The take-up creates a horizontal force, which often approximates the ultimate strength of the sheet. This "front tension" has four functions. It helps the rolls to "bite" the strip, it flattens the metal, it reduces the pressure, and it decreases the total power consumption because of the reduction in friction. Therefore, the thickness may be regulated to a certain extent by varying the tension. In the original design of a special reversible mill, the Steckel mill (Fig. 2), the total force was supplied by power reels, the rolls not being driven.¹ In this way, the reductions per pass are limited to about 30 per cent.

Rolling mills are also often equipped with power reels, coilers or other devices in back, to guide the stock and also mechanically apply a back tension. The back pull, which can be

FIG. 3—Krause strip rolling mill, which utilizes the reciprocating principle.



considerably increased in modern mills, reduces the biting capacity of the rolls. However, the roll pressure and the friction loss are also diminished and the flatness of the strip is improved. The power dissipated in the back pull can be regained by connecting the back reel to a motor generator.

Mass production plants are often equipped with a series or "train" of hot and cold rolling mills, installed close together, one following the other or in a tandem arrangement. In such a "continuous mill," a slab, strip (or rod) is often simultaneously rolled in several mills. Naturally this procedure requires a careful adjustment of the speeds, so that the stock does not push between any two mills, but pulls with a uniform tension. Modern tandem mills for cold rolling (and temper rolling) strip consist of two to five mills, generally of the four-high type, spaced closely together and equipped with power reels in front and back. The tension between the mills can be adjusted with the aid of special tension measuring devices. The strip thickness can be uniformly reduced as much as 40 to 50 per cent in each pass (corresponding to 50, 25, 12 per cent etc. of the initial thickness), or with a hard metal a large reduction can be effected only in the first or second pass.

The reciprocating principle upon which the forging roll, the pilger and the tube reducing processes are based has been utilized for the continuous cold-rolling of strip² (Krause mill, Fig. 3). In such processes only a certain tapered length of the metal is advanced by means of hydraulic or other clamp devices and rolled in each revolution. In the Krause mill the

floating rolls move horizontally through the action of a crank and connecting rod against a tapered housing. A range of 60 to 120 such cycles per min. with an advance of 1 to 2 in. each may be obtained, resulting in reductions of the strip between 80 and 90 per cent in a single pass.

Rolls³ are generally made of chilled plain carbon or alloy cast iron, and alloy cast steels, depending upon the requirements. In cold rolling, forged

rolls made from an alloy steel with an average composition of 0.85 per cent carbon, 2.0 per cent chromium are also used, while small amounts of nickel, vanadium and molybdenum may be added. Rolls are generally cooled on the interior and frequently also on the exterior.

Cold rolling rolls may not be cylindrical, but crowned or cambered to counterbalance the bending derived from the rolling pressure. The amount of crown which will yield flat stock without center or edge waves depends upon the type of metal, the size of the rolls and the reduction.

The surface condition of the rolls may vary considerably, according to the specific requirements. There is a tendency now to replace smoothly ground rolls for cold rolling by rolls roughened to a carefully controlled degree by shot-blasting or rolling with emery paper. The final strip is more uniform and the resulting "matt" finish not only covers slight irregularities in the surface but facilitates fabricating operations and has a better adhesion for coatings of any type. The favorable action of this finish in deep drawing may be attributed to the improved capacity for retaining a thin film of lubricant. In stretching operations such as in automobile body work a rough surface will adhere better and more uniformly to the blankholder than a smooth one.

The bearings are another important feature of a rolling mill. Most modern high speed mills and mills for the rolling of hard alloys are equipped with roller bearings. Flood-lubricated sleeve bearings are also increasingly used. Slow running mills, which do not carry excessive loads, are usually

¹ THE IRON AGE, Vol. 129 (1932), pp. 168-171, 214.

² F. R. Krause, Iron and Steel Engineer, Vol. 15 (1938), pp. 16-29.

³ Metals Handbook, 1939 Edition, pp. 1180-1186.

equipped with bronze bearings, which have to be carefully adjusted, cooled and lubricated. Also, cold mills may have synthetic fiber bearings ("Ryertex," "Micarta," "Lignalloys"), which are lubricated with water or a light oil.⁴ The loss of energy in the bearings usually increases as the total power consumption increases.

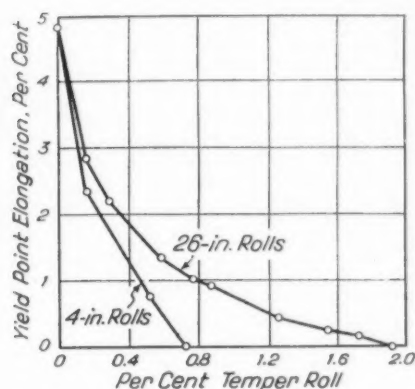


FIG. 4—Effect of roll diameter on the amount of temper rolling necessary to remove the yield point elongation. (Hayes-Burns)

The hot and cold rolling of a cast ingot proceeds in "passes" up to a 50 per cent reduction. In many cases, the surface is removed by machining before any rolling, or in others this "scalping" is done after a certain reduction. Metals which have a tendency to develop surface cracks or to split in the center, or "alligator," during rolling have to be reduced very carefully, within a narrow temperature interval during hot rolling or with repeated annealing during cold rolling. There is little definite information available concerning the rolling of sensitive materials. It seems, however, that a long soaking period prior to rolling, and intermediate annealing treatments after one or two passes, with a total reduction of only 10 to 20

per cent, appreciably minimizes the manufacturing problems. These difficulties are mostly concentrated in the initial stages of rolling, that is, before the porous, coarse grained and often segregated structure of the cast condition is converted to the more ductile wrought structure.

Hot rolled slabs are thoroughly cleaned by pickling and scraping before they are transferred to the cold mill—otherwise any scale adhering to the metal and surface defects would appear as a discolored area or inclusion on the surface of the finished sheet or strip. In breaking down metal by cold rolling, the direction of rolling should not be changed without intermediate annealing, in order to

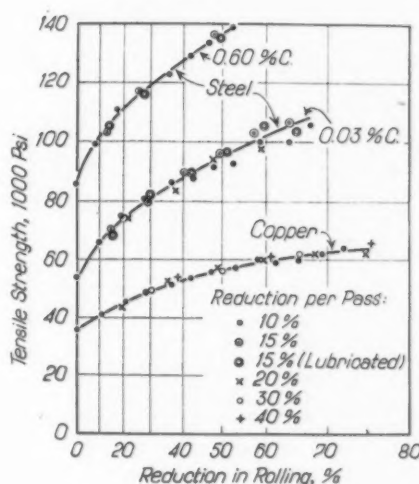


FIG. 5—Effect of reductions on the tensile strength. (Siebel)

avoid the tendency to crack during this "cross rolling."⁵

The total reduction possible by hot rolling without reheating is determined only by the loss in heat. Strip is rolled in continuous hot mills down to 0.060 in. thickness. In cold rolling the total reductions without annealing ranges between 50 and 80 per cent, depending on the ductility and hardness of the metal. Some pure metals, such as copper and aluminum, can be cold rolled down to very light gages (foil) without intermediate annealings.

Cold rolled sheet and strip is seldom supplied to the consumer in an annealed or "dead soft" condition. The commercially "annealed" metals and alloys are generally slightly strain-hardened by a final straightening operation, and in many cases a definite small reduction is effected by "skin rolling," "temper rolling" or "pinching." This process is performed for several reasons. The skin rolled metal

generally has a superior surface and is flatter than that which is only straightened. Skin rolled steel does not exhibit the localized irregular surface depressions or elevations after drawing, called "stretcher strains," "Lueders lines" or "Hartmann lines" or "worms." Small rolls are more effective for this purpose than large rolls" (Fig. 4). As the tendency to develop stretcher strains increases gradually with time, skin rolling to a very carefully controlled reduction⁷ is often performed not more than 24 hr. before deep drawing.

The metal is deformed rather uniformly⁸ by rolling compared to other working processes. The mechanical properties produced by severe cold rolling primarily depend upon the total amount of reduction, and only to a small extent on the reduction in a single pass⁹ (Fig. 5). Residual stresses in rolled sheet are small¹⁰ and not commercially significant. However, there are certain irregularities in the deformation of rolled metals which can be detected by different methods, such as rolling of bars with inserted screws¹¹, bars built up of layers of different materials, etc. The surface layers are not only compressed by the rolls, but also sheared in the direction opposite to that of rolling. It can be shown also by X-rays that the surface of rolled sheet is deformed to a greater extent and less uniformly than the core¹². Under conditions which are characterized by a high friction between the rolls and the stock, the irregularities in the deformation process will be more pronounced and cracks of any type may be more readily formed than with polished and lubricated rolls.¹³

This non-uniformity probably explains the differential effect of skin rolling in elimination of stretcher (CONCLUDED ON PAGE 108)

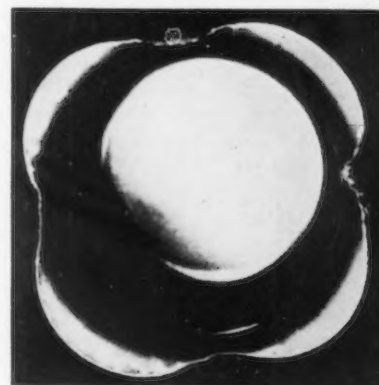


FIG. 6—"Ears" on a deep-drawn steel cup. Four-fifths actual size.

⁴ C. D. Phillippe, *Metal Industry* (London), Vol. 55 (1939), pp. 503-506, 529-531.

⁵ E. A. Smith, *Working of Precious Metals*, London (1933), p. 146.

⁶ A. Hayes and R. S. Burns, *Transactions, American Society for Metals*, Vol. 25 (1937), pp. 129-162.

⁷ J. Winlock and R. W. E. Leiter, *Transactions, American Society for Metals*, Vol. 25 (1937), pp. 163-205.

⁸ H. Unckel, *Arch. Eisenhuettenw.*, Vol. 10 (1936-1937), pp. 13-18; Vol. 12 (1938-1939), pp. 277-284.

⁹ E. Siebel, *Steel*, Vol. 93 (1933), No. 23, pp. 30-34.

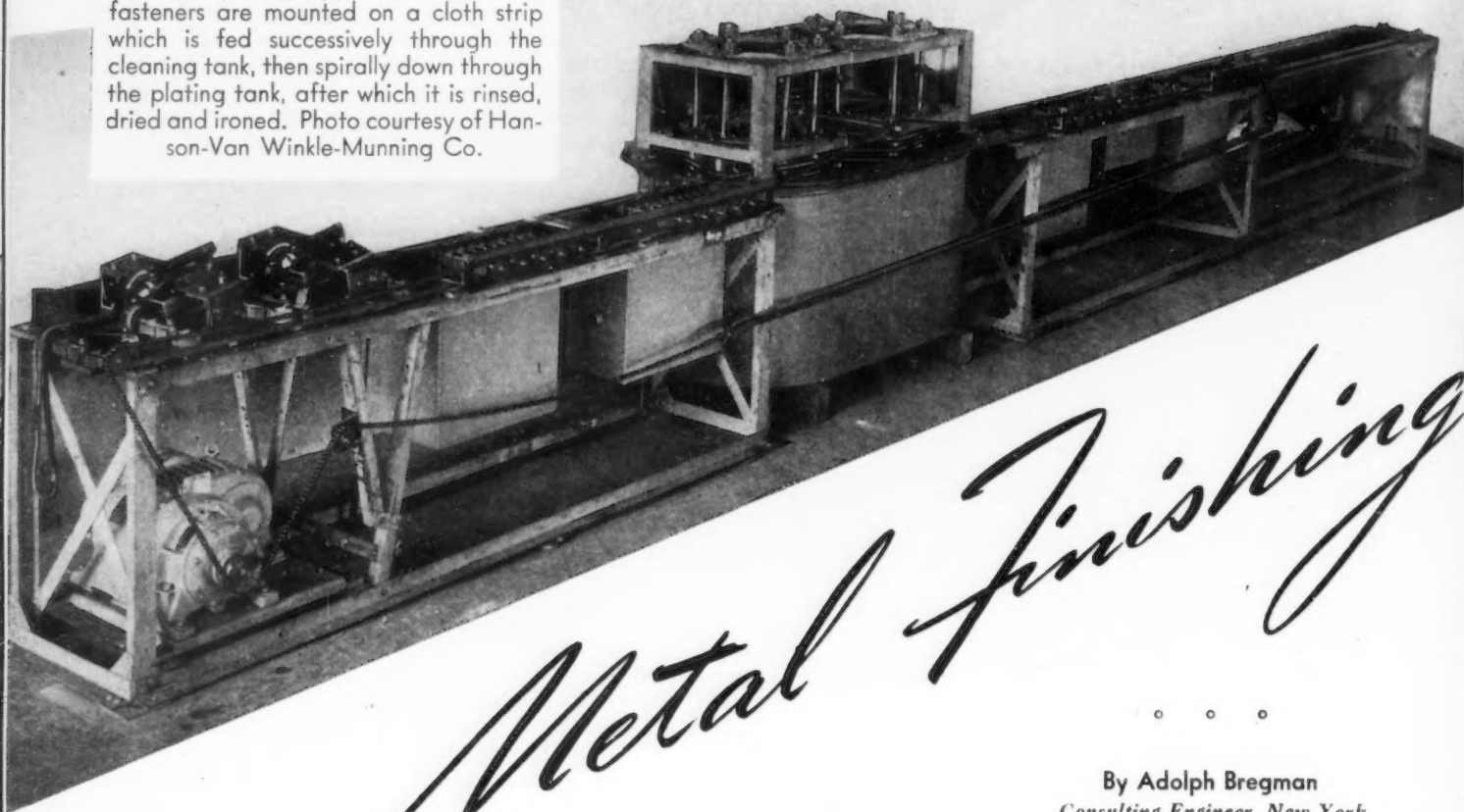
¹⁰ N. Dawidenkow and W. Bugakow, *Metallwirtschaft*, Vol. 10 (1931), pp. 1-6.

¹¹ N. Metz, *Review de Mét.*, Vol. 22 (1925), pp. 1-20, 77-87.

¹² G. Edmunds and M. L. Fuller, *Transactions, American Institute of Mining and Metallurgical Engineers, Institute of Metals Division*, (1932), pp. 175-189.

¹³ E. Siebel and E. Osenberg, *Mitt. Kaiser-Wilhelm Inst. Eisenforsch.*, Vol. 16 (1934), pp. 33-50.

SPECIAL automatic equipment used for electroplating zipper fasteners. The fasteners are mounted on a cloth strip which is fed successively through the cleaning tank, then spirally down through the plating tank, after which it is rinsed, dried and ironed. Photo courtesy of Hanson-Van Winkle-Munning Co.



Metal Finishing

By Adolph Bregman
Consulting Engineer, New York

THIS article deals with practical job and contract shop methods, applicable to manufacturing plants, for still and barrel plating and finishing work. The fundamental consideration is the calculation of all direct labor. In this, the first section of a two-part article, specific attention is given to shop work records, the estimating of labor costs, and comparison of job shop and manufacturers' costs.

• • •

A GOOD many months ago at a meeting of an organization of contract and jobbing electroplating and metal finishing shops, the members present indulged in a session which was dignified by the title "Practice Estimating." Actually it should have been called a guessing game.

One of the members had brought to the meeting samples of plated and finished parts which had already been processed in sufficient quantities to yield reliable cost figures. These were passed out to the members present, each of whom, after being given the

necessary data, finishes, quantities involved, quality required, etc., noted his estimate on a secret ballot and passed it up to the chairman. Each estimate was then listed on a blackboard in full sight and then compared with the others and with the actual cost records. The comparisons were as shown in Table I.

This and other similar meetings proved conclusively that their estimates were nothing more than "educated" guesses. It is well known also that this condition is not confined to those present at these meetings—it is true wherever electroplating and metal finishing are done.

It is quite likely that among the largest and best staffed manufacturing organizations, the variation in estimates would be narrower, partly because of their better trained and equipped cost departments and perhaps to a greater extent, because of their more homogeneous output, that is, less variation in types and quantities of work turned out. It is also true, of course, that most contract metal finishers are not business men in the full sense of the word. They are practical platers or polishers who have risen from the tank or the wheel—factory men, not "desk" men.

Nevertheless, with far too many manufacturers still treating their finishing departments as a necessary evil, knowing little if anything about the details of their operations and leaving their financial control to accountants or even clerks, also unfamiliar with the intricacies of this type of work, their figures are equally inaccurate.

Electroplaters have attacked this problem to devise a method which would be simple and practical, but at the same time accurate enough to allow them to estimate safely, with reasonable allowance for the unforeseen (which, in metal finishing, always happens). And since the manufacturer of metal products may legitimately consider, for purposes of calculation, that his finishing department is a separate unit or business, he may well use the contract platers' method as a guide in principle, if not in detail. The finishing department, to which he sends his parts to be finished, may be considered to bill him and be paid by him for its work.

In order to obtain a representative break-down of their costs, a number of platers submitted figures from their annual profit and loss statements, which were combined and reduced to percentages to show the "normal" ex-

THIRTEENTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

Costs

penditure for each dollar of sales, as shown in Table II.

For simplicity, the figures in Table II have been made "round." In actual practice, of course, they will appear as fractions with variations in individual cases for local conditions. The round numbers provide a better general guide than a photographic reproduction of any single plant condition. Some of these items may be reduced or omitted by departments of manufacturing plants. Item 3 may be reduced as the finishing department has no salesmen. It must not be omitted, however, as it should be debited with its share of the expense for executives and salesmen of the "company." Bad debts will be omitted, but discounts should be included, to cover the department's share of the discount allowance made by the company. Profit may be omitted, of course, as the department may be said to bill the company at cost.

Note, however, that little if any allowance has been made for rejects, emergency conditions, unforeseeable accidents, breakdowns, etc. Consequently the above are the *minimum safe figures* to yield the moderate 10 per cent profit.

From Table II certain conclusions may be safely drawn:

(1) Prices for electroplating work should be $2\frac{1}{2}$ times the total direct labor in order to show a moderate margin of profit, 10 per cent.

(2) In order to be accurate the estimate must include *total direct labor*—every operation.

The $2\frac{1}{2}$ to 1 factor for total direct labor can be used for all "still" plated decorative work on base metals. It is not applicable to barrel plating, hard or industrial chromium, hard or industrial nickel, or precious metal plating. Barrel plating requires very little labor, but has long "dwells" in the barrel. Hard chromium work spends

so much time in the tank, uses so much power, and so often calls for special preparatory work, racks, jigs, etc., that special provision must be made for these factors. For heavy nickel deposits, provision must also be made for the additional power and the metal deposited. Prices for precious metal work must include special allowances for the high priced metal.

Shop Work Records

It is generally recognized that in practical plating shop operations it is difficult to keep close track of plating labor. Unlike the polishing department, the work of plating must be divided among a number of individuals with different rates of pay. Often the plater, the highest priced man in the department, will find it impossible to estimate his time on each job as his work is largely supervisory, and the manual labor, to a considerable extent, is done by helpers and boys.

It is possible, however, to simplify record-keeping to make it practical, still maintaining reasonable accuracy. A simple job card which can be used for any class of work is shown in Table III, with a few blanks filled in. From this or a similar card the time of all types of labor put in on a job can be totaled. It is also possible, of course, to make up a job card which will include every single item of cost, materials, rate per hour of each individual, etc., but it has been found

from practical experience that job cards—cards which accompany the work through the shop—should be kept as simple as possible. Detailed and minute entries must be left to the clerical staff.

Estimating Labor Costs

In the matter of estimating, the method can be kept equally simple. The estimate may be divided into two parts, polishing and plating. Taking as an average the figure of 90c. per hr. for skilled polishing labor, the polishing price may be figured at $2\frac{1}{2}$ times 90c. or \$2.25 per hr. The plating shop labor rates range from the skilled plating foreman down to the unskilled boy, but a fair average would be 60c. per hr. The plating price may, therefore, be estimated at $2\frac{1}{2}$ times 60c. per hr. or \$1.50 per hr., without attempting to itemize in detail the specific rate for the time which each employee puts on each piece.

Again it must be pointed out that these figures are general, subject to the rates of pay and other special conditions in the specific plant in which the work is done.

The elements of this method of cost estimating, however, are simple, being confined to the following factors: (1) an estimate of the polishing labor; (2) an estimate of the plating labor (both polishing and plating are figured in terms of time put in or the number of pieces turned out per hour); (3) a fair figure for the aver-

. . .

ELEVATOR type full automatic plating conveyor, a new type of labor cost cutter in the plating industry. Photo courtesy of Hanson-Van Winkle-Munning Co.

. . .

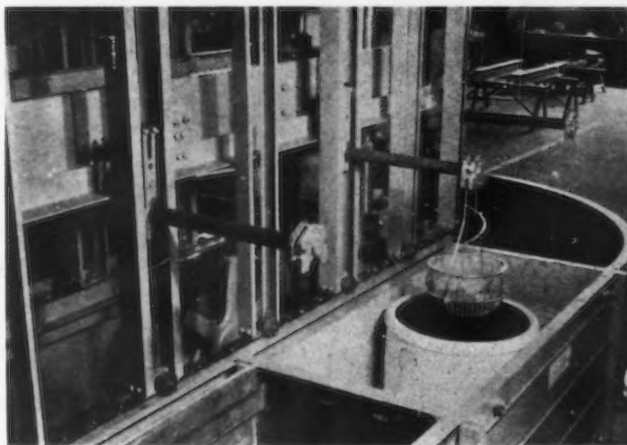


TABLE I
Estimates vs. Costs

Samples	Actual Cost	Estimates
1	\$0.05	\$0.02 to \$0.10
2	0.15	0.08 to 0.25
3	0.40	0.20 to 0.75
4	2.00	1.00 to 4.00

TABLE II
Expenditures per Dollar of Sales

Items of Expenditure	Percentages of Sales Dollar
(1) Direct labor:	
Polishers, platers, helpers, boys, etc.	40
(2) Indirect labor:	
Receiving, office, shipping, delivery	10
(3) Executives and salesmen	10
(4) Materials (excluding precious metals)	10
(5) Rent	3.5
(6) Power	3.5
(7) Fuel and water	1.5
(8) Insurance (compensation, fire, liability, etc.) ...	2
(9) Taxes (unemployment, social security, etc.)...	3
(10) Repairs and depreciation	3.5
(11) Discounts and bad debts	2
(12) Telephone, office supplies, miscellaneous, etc.	1
Total	90
Profit	10
Total	100

TABLE III
Job Card

Factory Order No.—1298	Date—6/12/39
Name of Customer—Doe & Co.	Finish—Copper, Nickel, Chrome
Article—Holder	No. pieces—1,000
Time Promised—7/1/39	Instruc.—Spec.
Name of Operator, Operation Performed and Quantity Done	Time
Mike Jones—cut down 200	Start Mon. 8 Finish (8) Mon. 5
Mike Jones—cut down 230	Start Tues. 8 Finish (8) Tues. 5
	Start Finish
	Start Finish
	Start Finish

age rate of pay per polishing hour (or per hour of wheel time) and for the average plating room labor hour; (4) the application of the factor, $2\frac{1}{2}$, to the total direct labor costs involved; (5) provision for special items, such as expensive materials, precious metals, etc., and for excessive power or

TABLE IV
Monthly Operating Costs of a Variety of Plating Shops

	Shop No. 1 4 Polishers	Shop No. 2 5 Polishers	Shop No. 3 12 Polishers	Shop No. 4 10 Polishers	Shop No. 5 10 Polishers
Labor:					
Polishers	\$525	\$875	\$1560	\$1310	\$1360
Platers, helpers, lacquers, dippers, wires (male and female), inspectors	225	350	1615	1325	610
Executive and sales	650	435	435	650	700
Office	65	85	85	85	110
Materials	100	275	1000	1000	400
Rent	125	135	225	250	200
Power	100	100	250	300	250
Gas, water, coal	15	50	50	100	125
Insurance	25	50	150	125	150
Repair and depreciation ..	100	115	250	430	315
Bad debts and discounts ..	75	90	300	320	195
Trucking and shipping	100	75	355	265	210
Telephone and stationery, etc.	45	30	50	50	50
Miscellaneous and emergency	100	40	200	250	200
Total cost	\$2250	\$2705	\$6525	\$6460	\$4875
Cost per hr. of wheel time (Total dollars divided by total polishing hours per month—175 per polisher)	\$3.21	\$3.09	\$3.11	\$3.69	\$2.79

metal consumed by industrial work which spends a long time in any plating tank.

In principle, this method can be applied to any metal finishing plant or department, almost regardless of the complexity or high degree of automatic equipment involved. To be sure, a full automatic plating machine will reduce the plating labor to much lower figures, just as automatic polishing machines will cut labor costs deeply. Consideration of the effect of such equipment must be included in the overhead items, such as interest on investment and depreciation, raising these percentages. The factor, under such conditions, therefore, may be raised from 2.5 to 2.75, 3, or more, but once obtained, it can be used steadily with a good degree of accuracy.

"Wheel Time" Estimates

Other estimating procedures are available, even simpler than that described above, but not so reliable. One commonly used method, which may be applicable to the "general run" of chromium plated steel, is based entirely on polishing labor (or "wheel time"). It was originally developed by comparing the records for the operating costs of several of the smaller plating shops in New York, as shown in Table IV.

Note that in spite of the variation in individual items, all of these results group themselves about \$3 per hr. of wheel time, except for Shop No. 4, which turned out to be a special case.

This shop does a great deal of fancy plating and finishing work, coloring, oxidizing, dipping, etc., much of which requires a small proportion of wheel work and a large amount of plating room work. Hence the plating room

TABLE V
Cost of Finishing an Iron Cover

Direct Labor:	
Burr edge	0.43 hr. @ 76c... \$0.3268
Brush	0.48 hr. @ 76c... 0.3648
Polish	0.51 hr. @ 76c... 0.3876
Nickel plate	0.70 hr. @ 60c... 0.4200
Color buff	2.10 hr. @ 76c... 1.5960
Chrome plate and buff complete. 2.00 hr. @ 72c...	1.4400
Total	6.22 hr. \$4.5352
Overhead	6.22 hr. @ 77c... \$4.7894
Material:	
Nickel finishing material	70 sq. ft. @ 1.25c... \$0.875
Chromium finishing material	35 sq. ft. @ 1.11c... 0.385
Total	\$1.26
Total Cost	\$10.5846

TABLE VI
Comparison of Costs for Two Systems

	James' Figures	Table II
Direct labor ... \$	4.54 = 38.5%	40%
Overhead	4.79 = 41.0%	40%
Material	1.26 = 10.5%	10%
Profit	1.18 = 10.0%	10%
	\$11.77 = 100.0%	100%

costs are high in proportion to polishing.

On the "general run" of chromium plated work, therefore, involving polishing and buffing, an estimate may be made at the rate of \$3 per hr. of total wheel time (cutting down, buffing, coloring etc.). This is a quick, simple calculation, but not always accurate as varied types of work demand varied proportions of polishing to plating labor. For example, castings may need much more grinding and polishing than sheet metal, although about the same labor in plating. If the estimates on rough castings are based on \$3 per hr. of wheel time, they will be very high. Conversely, if the basis metal consists of high grade steel with a first rate finish, which requires little if any cutting

¹ "A method of costing plated products," by R. M. James. Presented at the Convention of the American Electro-Platers' Society, Detroit, June 11-15, 1934.

² "Costing in the Electroplating Industry," by H. E. Snyder. A paper read at the meeting of the Chicago Electro Platers Institute, June 11, 1936.

TABLE VII
Cost Analysis as Indicated by
H. E. Snyder

Total cost	\$39,800	
Profit (inserted by the present author, presumably 11%)	4,422	
Sales price	\$44,222	
Direct labor	\$15,500	= 35.0%
Overhead	20,650	= 46.7%
Materials	3,650	= 8.3%
Profit	4,422	= 10.0%
Total	\$44,222	= 100%

down, estimates based on only \$3 per hr. of wheel time will be too low as they will not allow sufficient margin to include the plating operations, copper, nickel and chromium.

Job Shop-Manufacturers' Costs

It will be interesting to check the job platers' method against the prac-

tice in manufacturing plants. R. M. James¹ reported on the cost of finishing an iron cover, as shown in Table V.

To this total cost of \$10.59 per 100, add 1/9 or 11 per cent for profit (to show 10 per cent on the sales price), which is \$1.18, giving a total sales price of \$11.77 per 100 pieces.

Table VI gives a breakdown of these figures and compares them with the percentages shown in Table II.

It is clear at a glance that these two sets of figures check very closely.

Another analysis by H. E. Snyder² covers a period of 15,000 hr. of polishing and buffing work and 10,000 hr. of plating. The breakdown of his figures is shown in Table VII.

This shows only a fair correlation with the other examples, but it is in the same range.

Ed. Note:—Next week the author will conclude with descriptions of finishing departments vs. contract work, barrel plating, labor in bright nickel plating, etc.

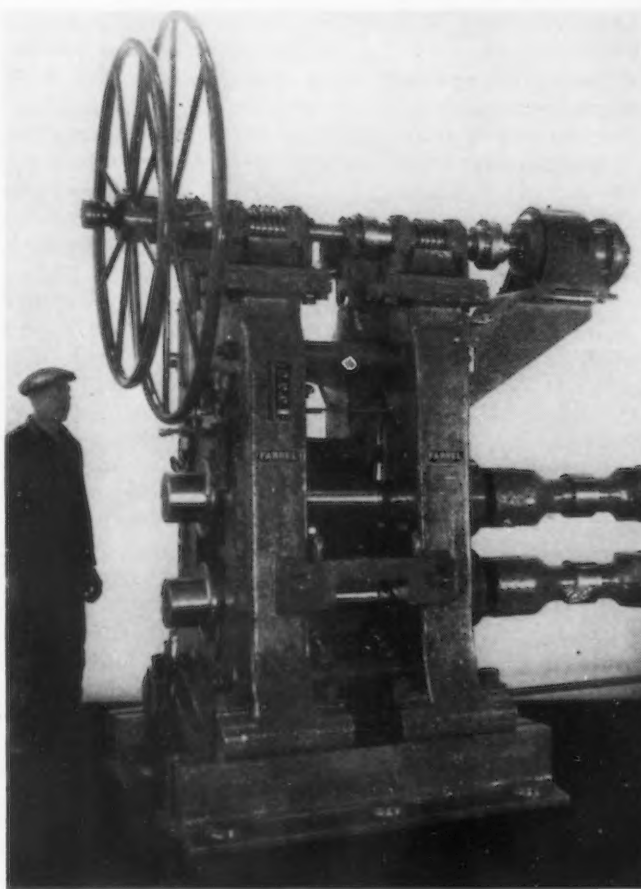
Versatile Rolling Mill for Non-Ferrous Metals

A ROLLING mill that meets some rather unusual requirements has recently been designed and built by Farrel-Birmingham Co., Inc.

It is a 16 x 16 in. two-high mill (shown herewith) to be used for rolling a wide variety of metals, including copper, brass, bronze, silver, nickel silver, monel metal, bi-metals and semi-precious metals. It is used for all rolling operations from breaking-down to finishing and is of heavy, rugged construction to handle large reductions.

The rolls are of forged alloy steel, heat treated to provide the proper hardness and bored to permit the internal circulation of cooling water, if desired. The housings are the closed top type, cast in one piece of Meehanite. They are of large section to provide the strength necessary for the work to be performed. Roll neck bearings are bronze, of the open, half hexagon, block type, carried in chocks of cast steel and arranged for water cooling. The bearings are grease lubricated by a force feed lubricator, chain driven from the main reduction drive.

The top roll is adjusted by a combination double-hand-wheel screwdown, to which is also connected a motor drive for rapid approximate positioning of the roll. The top roll counterbalance is hydraulic, consisting of two hydraulic cylinders located one each directly beneath the mill housings. Rams act upon lifting yokes, which support the top roll assembly through lifting rods. Delivery and feed tables are made of Meehanite. The delivery table is surfaced with a hardened steel wearing plate and the feed table is provided with right and left hand adjustable guides. Two wipers are provided, one on each roll; these are felt-covered wooden blocks, spring loaded. A safety bar tripping device is located over the rolls for quick stopping in an emergency.



MODERN GAGING PROBLEMS

By NELS SWENSON

Superintendent, Warner & Swasey
Co., Cleveland

TODAY'S machining tolerances are a mere fraction of yesterday's 2 to 5 thousandths. But, today's accuracy depends on incessant checking of the many gages used

YEARS ago there were machinists who were widely admired experts at the handling of calipers. When machining a shaft to fit a bearing, they could measure the hole with inside calipers, quickly fit their outside calipers to the inside calipers, then turn the shaft to a running fit—or a drive fit or press fit, whatever the job required—without any further to-do about it.

Those men, with their highly skilled fingers, were the experts of their day. But that was 40 years ago. Their day, as well as themselves, has long since passed.

Today, extreme limits those men didn't even think about are routine specifications. And calipers, though not exactly museum pieces, are in little use in modern production shops. The whole problem of gaging has become a matter of vital importance in machining operations—of such importance that in the Warner & Swasey Co. plant, for example, some 5000 gages and other measuring instruments are now required, and the testing of finished parts and the checking of these gages alone require the full-time services of several men.

Although the caliper touch was cultivated to a remarkable degree in many cases, it is doubtful if the average operator of 40 years ago worked to tolerances of less than 2 to 5 thousandths. It just wasn't important then to do a better job. Today, of course, average machine tool work must be many times that accurate. The filing and other hand work done in fitting shafts in that

earlier day, for example, are now absolutely unacceptable.

With the demands for such accuracy so great, the problem of handling and keeping accurate the thousands of gages of all types required has become one of the most important in the modern plant. Continual checking against master standards is necessary if the manufacturer today wants any assurance as to what he is really turning out in his shop.

The problem of gages is twofold: (1) Maintaining an extremely accurate standard of length, and (2) checking the gages used in the shop against this standard, or, more correctly, transferring the standard to the gages.

The Warner & Swasey standard of length is embodied in a 4-ft. Pratt & Whitney measuring machine which is accurate to within 0.00001 in. Its measuring head includes a microscope with a hair-line graduation which is used to match the hair line on the master bar, and a precision measuring screw which subdivides one inch. This instrument is kept, along with other extremely accurate testing equipment, in a constant-temperature room.

Shop gages are checked against this standard by means of gage block and comparators. There are two such setups in the plant—one in the standards room and the other in the tool crib. The gage blocks are checked frequently and kept accurate at all times—one set to within 0.000020 in. and the other set to within 0.000010 in. The comparator in the standards room,

where the more accurate work is done, is a latest type Pratt & Whitney "electrolimit" gage. The dial of this highly sensitive instrument, which combines mechanical gaging with electrical magnification, is graduated in 20 millionths of an inch.

Standard angles in the shop are embodied in a Zeiss measuring microscope, the cradle of which can hold diameters up to 10 in. This instrument is used for the high-precision sectional and contour measurement of screw threads, and for general maximum-precision co-ordinate and angular measuring. Measurement is made by comparison with standard glass scales. The protractor ocular scale is graduated in minutes.

Because of their great variety and the wide range of purposes gages serve, there can be, of course, no uniform procedure on the method and frequency of gage checking, nor even on the handling and routing of gages to the jobs where they are used. The Warner & Swasey plant normally produces between 16,000 and 18,000 different parts, the average production of each of these being about 25 pieces at a time—and they differ very widely in design, material and size.

A variety of different gages and measuring instruments, both of the dial indicator and fixed gage type, are used. Dial gages are easy to read and suffer little from wear. Fixed gages can be checked by an inspector who is unusually skillful and who has at his service master gages and blocks and the finest of precision instruments.



In checking plain holes, conventional "go-and-no-go" gages are used. Those used for rough work, where several thousandths are left for heat treating and grinding, are checked only four or five times a year, for they can be off as much as a thousandth without harmful effect. But gages used for accurate work are checked at least once a week. Some of these gages, such as the ones used on lockbolts and lockbolt sleeves that go into a turret slide and saddle are checked after every run, when they are returned to the tool supply. On this type of work, only chromium-plated gages are used and they are kept to a limit of 0.00005 in.

It has been found that the most efficient method of handling and distributing gages is to have the central tool supply issue whatever gages are required with the set-up of each job, that is, with the tools and materials. The gages are issued by the tool supply on check numbers.

In checking diameters, master disks or comparators are used with machinists' micrometers—for accurate work. Master disks are used on spindles, for example, and on vital bearings and gears that require limits of ± 0.0000 in. This eliminates the human equation since the operator will instinctively mike both the job and the standard with the same touch. Master disks

MANUFACTURERS are now building machine tools that can turn out parts to increasingly exacting limits. Yet maximum advantage cannot be taken of these machines if users haven't the ability or the facilities to properly gage the work as it is being produced.

o o o

are not checked as often as plug gages, since they are not subjected to as much wear, although some of them are tested once a week.

o o o

A LONG tap being checked in a Zeiss measuring microscope in the standards room.

o o o

All micrometers above 1 in. are furnished by the company. However, some men like to use their own mikes, even up to 3 and 4 in. But regardless, all mikes in the plant that are used to any extent are checked at least once a week. This work is done by an inspector in the tool supply who spends full time at the job. He checks especially for parallelism of anvil and spindle surfaces.

Bar gages, including the adjustable (micrometer) type, are, of course, used extensively. These are checked on the precision measuring machine in the standards room at least once a month. They are kept to a limit of 0.0001 in.

The common type of internal and external thread gages are used, and they are checked frequently, depending upon the amount of use they receive. In the case of external threads, the adjustable female working gages are set to a snug fit on the master male gages. In the case of tapped threads, only up to 0.3 is left between the master set plugs and the adjustable ring gage, and between the ring gage and the work plug.

Both plug and ring type taper gages are used and these are checked against master reference gages every time they are issued with a job. There is a master reference gage for every important taper cut in the plant. These master reference gages seldom require checking since they are subjected to little wear. Taper gages used to test spindle noses are allowed a tolerance of only 0.5.

Gages are checked in the standards room by an expert assistant who spends his full time at the job. After many years of experience, he knows which gages get the most use. He



checks the $\frac{1}{2}$ in. plug gages a lot more often than the $\frac{5}{8}$ in. for example, and the gages used at the grinders a lot more often than those used at the turret lathes. Some gages are used only a few times a year.

A detailed record of all the precision, plug, ring and functional master gages of all types in the plant that are tested in the standards room is kept in a 3x5 in. card file. These

the full time services of an inspector who operates two Maag testing machines. One is a profile testing machine, used for spur and helical gears with involute teeth, and the other is a center distance and concentricity testing machine, used for spur, helical, bevel, and worm gears.

The first machine makes a diagrammatic record of the deviations of the tooth profile from the theoretically

The small slips of paper on which these machines register their records are identified, dated, and filed for future reference. The inspector holds the grinder operators to 0.0002 on the involute.

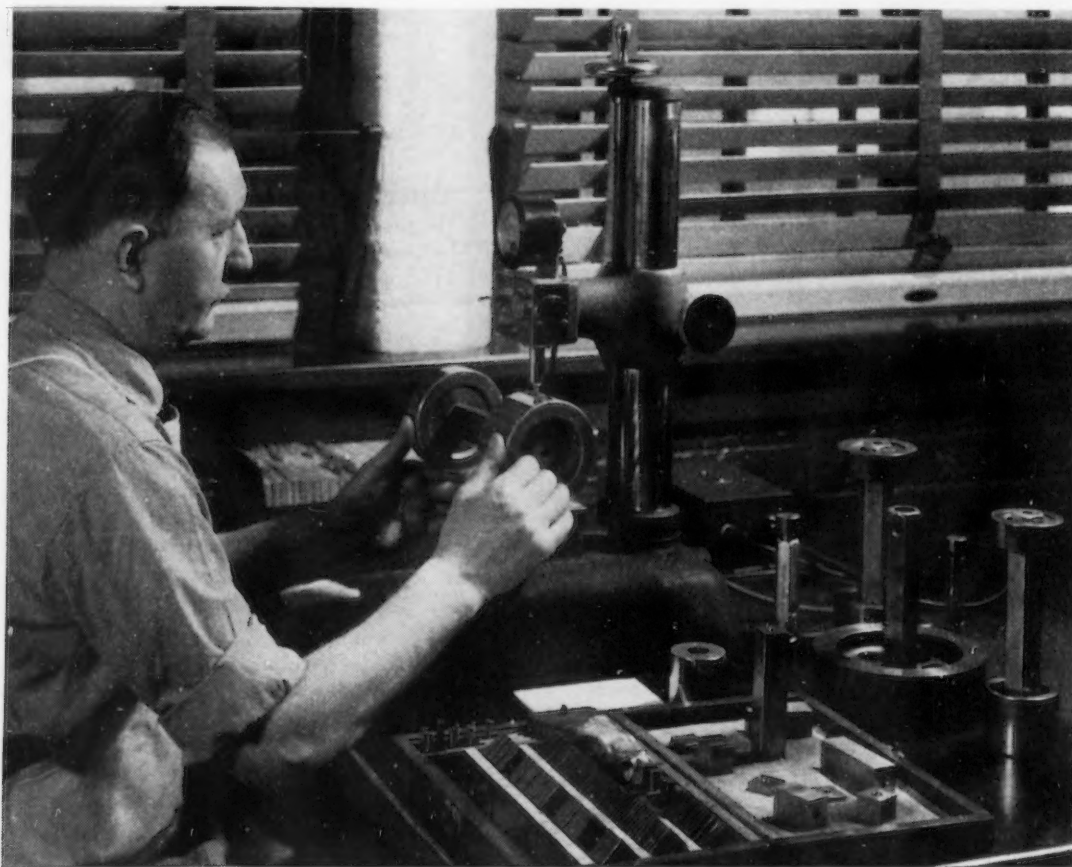
To maintain gear work at as high a standard of accuracy as possible, the gear cutters are carefully tested, including, as a double check, even new units as they come from the supplier.

For this purpose a Fellows gear-shaper involute tester equipped with a tooth spacing attachment is used. The topping as well as the involute and tooth spacing are tested, so that all that the men in the gear cutting department have to check is the outside diameter. A special mimeographed form sheet has been worked out for recording these tests.

Another item recently added to the equipment in the standards room and found to be very useful is a Bausch & Lomb contour measuring projector which throws a magnified image of an object on an 18-in. ground glass. With mag-

nification up to 100 diameters, this machine is used in the rapid inspection and measurement of screw threads, thread plug gages, thread ring gages, gear teeth, the meshing action of a pair of gears, and also contour forming tools, cams, lead screws, chasers, hobs, and so on.

It is important that manufacturers today make use of every facility at their command to check and re-check the vital parts of the product they turn out. Manufacturers are now producing machine tools that can turn out parts to increasingly exacting limits. Yet maximum advantage cannot be taken of these machines if users haven't the ability or the facilities to properly gage the work as it is being produced.



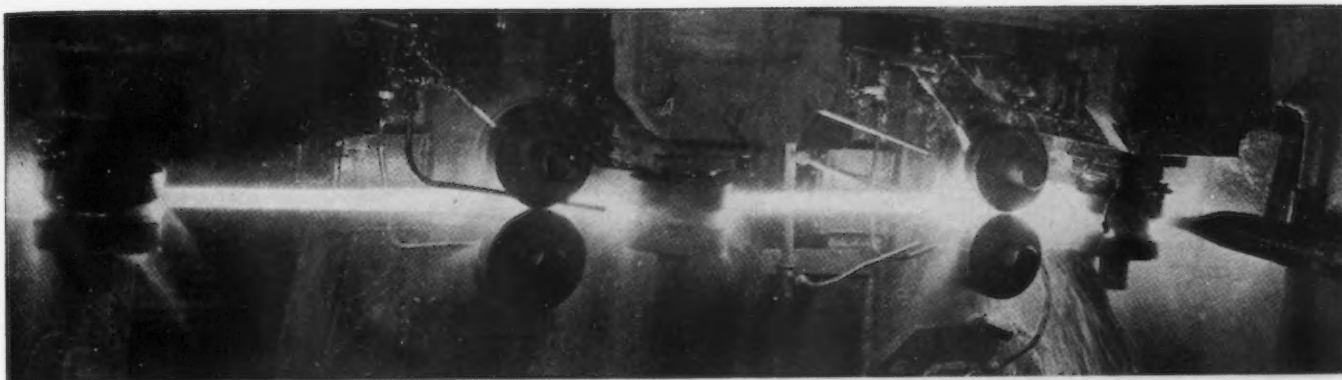
P LUG gages being checked in the standards room.

cards include a description of each gage, its number, and a record of its variation each time it is tested. The test figures are recorded in hundredths of thousands. A gage that is over-size 0.15, for example, is recorded as +15.

It is vitally important that the chucks used on turret lathes fit the spindle noses to extreme limits. Therefore, regularly every six months all gages used by supplying chuck manufacturers are called in and checked in the standards room. In this way there is a certainty that the threads on both spindles and chucks will be accurate to within a few ten-thousandths.

The problem of checking ground gears is also a responsibility of the standards department. This requires

correct involute tooth form. These deviations are automatically drawn on a slip of paper, the deviations being magnified 350 times. The second machine measures the play between the pinion and wheel profiles when the gears are located at their correct center distance. This is in order to determine whether there will be any possibility of the gear teeth binding (due to increase in temperature) when the unit is in operation. When the two gears are rotated while engaging without back lash, the indicator on the apparatus shows to what extent both sets of teeth are concentric to their axes and whether the engagement of the teeth is free from shock. The recording device clearly shows variations of 0.0001.



Butt Welding Pipe Continuously

A Biography By

JAMES HOPKINS

*Sales Manager, Salem Engineering Co.,
Salem, Ohio*

and

T. C. CAMPBELL

Pittsburgh Editor, The Iron Age

THIS historical story on the continuous butt weld or Fretz-Moon process for pipe making is appropriate at this time in view of the fact that Youngstown Sheet & Tube Co., Spang Chalfant division of National Supply Co., Wheeling Steel Corp., Republic Steel Corp., and Bethlehem Steel Co. will each begin operation of a new continuous butt weld mill next month or the month following. In all these cases, except Wheeling Steel, the latest installation represents a second modern unit, the first ones having been installed in 1939 or earlier.



WHEN modest John Moon began tinkering with the idea of a continuous butt weld pipe mill back in 1911 and finally in 1923 obtained patents on the Fretz-Moon pipe process, he had no idea that 16 years after constructing the first mill a considerable number of plants would have been laid down in the world with

approximately 1,600,000 tons a year capacity for continuous butt weld pipe. Nor did he dream that by the time it would be possible to make butt weld pipe by his process up to and including 4 in.

Returning to America in 1912 after having spent considerable time in consultation with Stewarts & Lloyds in England regarding operation and construction of conventional butt weld pipe mills, John Moon, a young engineer located with the Longmead Co., Philadelphia, began to seriously consider the construction of a continuous butt weld pipe mill. Subsequently he, with S. S. Fretz, Jr., who later became a partner in the company, undertook the first rude experiments on the continuous butt weld pipe.

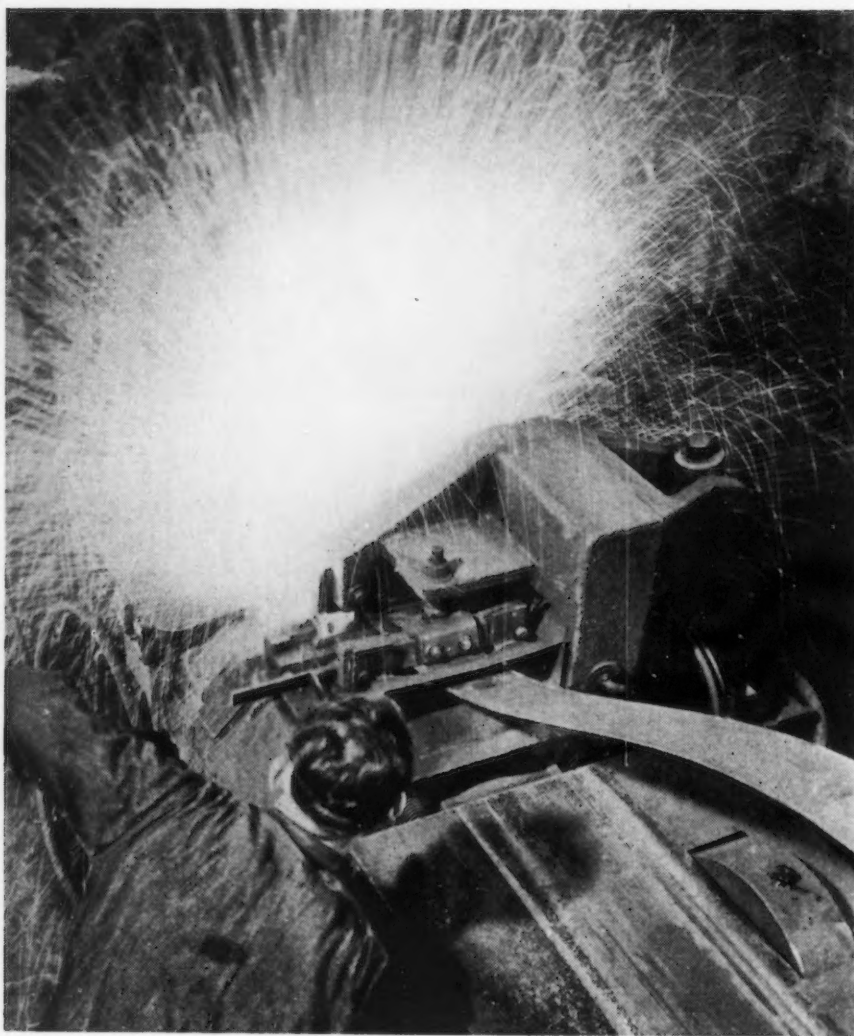
Nearly 100 years had passed since the inception of the conventional method, making possible large tonnage production of butt weld pipe. It was Cornelius Whitehouse who, in 1825, succeeded in drawing white hot flat strip through a "bell" or die to form and weld, in one operation, a pipe from

a flat strip. This development became the basis of our commonly known conventional butt weld mill.

The first experimental mill and furnace constructed by Moon and Fretz cost \$525 and the average kitchen in the home could accommodate the first 10-ft. long furnace, fired by one fuel oil burner. The forming rolls used in the first experimental mill were 3 in. in diameter and produced $\frac{7}{8}$ -in. pipe.

This humble effort was at once successful enough to carry further and the Fretz-Moon Tube Co. came into being during 1921 and 1922, four men being interested who set out to produce pipe in a shop approximately 100x100 ft., at Philadelphia. Foot by foot the heating furnace reached a total length of 35 ft. It had a total of 14 burners, seven on each side, and the skelp was kept off the furnace bottom by water-cooled skid pipes. By this time the forming rolls had been enlarged to 6 in., making possible production of pipe up to $\frac{3}{4}$ in.

Skelp was fed in single coils and efforts were being made to acetylene



ELECTRIC welding of skelp ends together after straightening, in the initial steps of the Fretz-Moon process.

weld the coil ends together to form a continuous process. The finished pipe, after going through the welding and forming mill, was cut off by a hand-operated bolt clipper and the pipes saws. An amazing feature at that time was that out of an initial run of 15 tons of skelp, the majority of the tonnage was sold to the trade at once.

The success of this primary endeavor was such as to require additional equipment and a new location. Skelp was being shipped in from Pittsburgh to Philadelphia, while the finished pipe went back into the Western territory. After looking over several sites, the Fretz-Moon Tube Co., in 1923, moved to Butler, Pa., where it set up business in an old bedstead plant, having available a building 100 x 600 ft. At this particular phase of the development, Mr. Fretz elected to remain in Philadelphia, leaving John Moon to go ahead with the plant at Butler. One of the factors respon-

sible for locating at Butler was the supply of economical gas fuel.

The small mill laid down at Butler had a range of $\frac{1}{8}$ -in. to 1-in. standard pipe, using a furnace 35 ft. long. Step by step this furnace arrangement grew to 85 ft. in length.

On this small mill, a hand-operated saw was developed, eliminating losses in crop ends which resulted in the use of the bolt clipper method. The descaling or sizing mill was soon developed and hence by a continuous process, uniform sized pipe could be produced.

The use of acetylene welding to join the strip (which necessitated subsequent cutting out of the welded zone) was eliminated by the development of an electric flash welder to electric weld the ends of the skelp together. With this particular improvement, the plant was now complete.

Where the first crude effort cost about \$525 for the mill plus a few bricks employed in the furnace, the

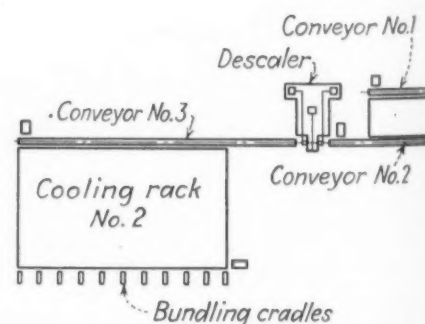
plant constructed at Butler cost about \$27,000. The Fretz-Moon Tube Co. became firmly established at Butler and obtained enough tonnage to build another unit which subsequently made pipe from $\frac{3}{8}$ in. to $2\frac{1}{2}$ in. in diameter, while the first unit produced tube $\frac{1}{8}$ to 1 in. exclusively.

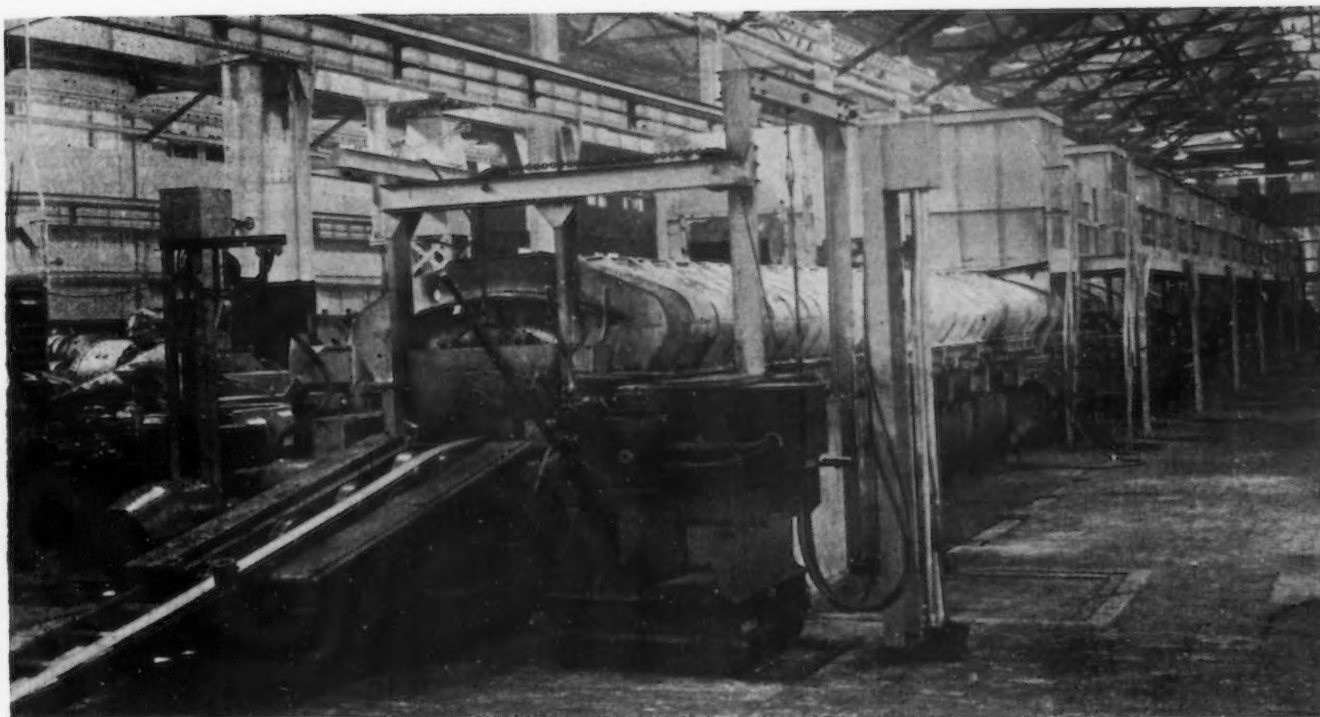
Patents on the Fretz-Moon process were applied for and granted in late 1923 and for several years enterprising John Moon, a typical pioneer, was inventor, operator, manager, salesman, and purchasing agent of this small company. During those early days and for some time thereafter, the Fretz-Moon Tube Co., in addition to servicing its own consumers, on innumerable occasions supplied considerable tonnage of continuous butt weld pipe in certain small sizes to other large steel pipe mills who, in turn, consigned it to their customers.

Although several major steel companies in this country considered the Fretz-Moon process of making pipe, Europe, during the years 1922 to 1929, looked into the development much more closely than did the local plants. To this end, Mr. Moon went abroad to license the process. He came home in 1929 upon receiving word that American companies had become vitally interested in the Fretz-Moon method. Republic Steel Corp. and Spang Chalfant had made a decision to buy out the Fretz-Moon Tube Co. and the patents, retaining Mr. Moon as chairman of the board, a position which he still holds. About this time one of the Butler units was completely revamped so as to make pipe up to $2\frac{1}{2}$ in. in diameter, with the furnace being increased to a length of 125 ft. Other accessory machinery was, of course, enlarged accordingly.

Although several continuous butt weld pipe mills were constructed outside of the United States shortly after 1929, it was not until 1938 that a continuous butt weld pipe mill was completed in this country. A modern

A DIAGRAMMATIC layout of a modern encountered in bui





CLOSE-UP of the heating furnace showing strip entering the furnace. The strip welder is at the left. After welding there is an excess of strip played out in order to compensate for the subsequent weld cycle as the strip moves through the furnace continuously. In the foreground may be seen the "skelp to needle welder" used when threading the furnace.

Fretz-Moon type mill started production at Spang Chalfant Co., Inc., division of National Supply Co., in the spring of 1938, equipped to make pipe by the continuous process in sizes ranging from $\frac{3}{8}$ in. to and including 3 in. and with an estimated capacity of 85,000 tons a year.

In the next 12 months additional plants were completed or construction begun in the United States by Republic Steel Corp., Youngstown Sheet & Tube Co., Spang Chalfant Co., Inc., Bethlehem Steel Co., and Wheeling Steel Corp. Included in this series of projects are three mills which will make continuous butt weld pipe up to and including 4 in. During the same period a mill was also constructed for Page-Hersey Tubes Ltd., Welland,

Ont., Canada. Data on these mills are included in the accompanying table.

Experience gained on previous mills enabled the redesigning of the machinery required so as to simulate the most modern steel finishing equipment. The Fretz-Moon, or continuous butt weld, type mill is truly a continuous process from start to finish. Coils of skelp are welded one end to another, passed through a heating furnace and a series of forming machines. These form pipe, sized and cut to lengths, ready for testing and finishing, with not a single break in the entire operation.

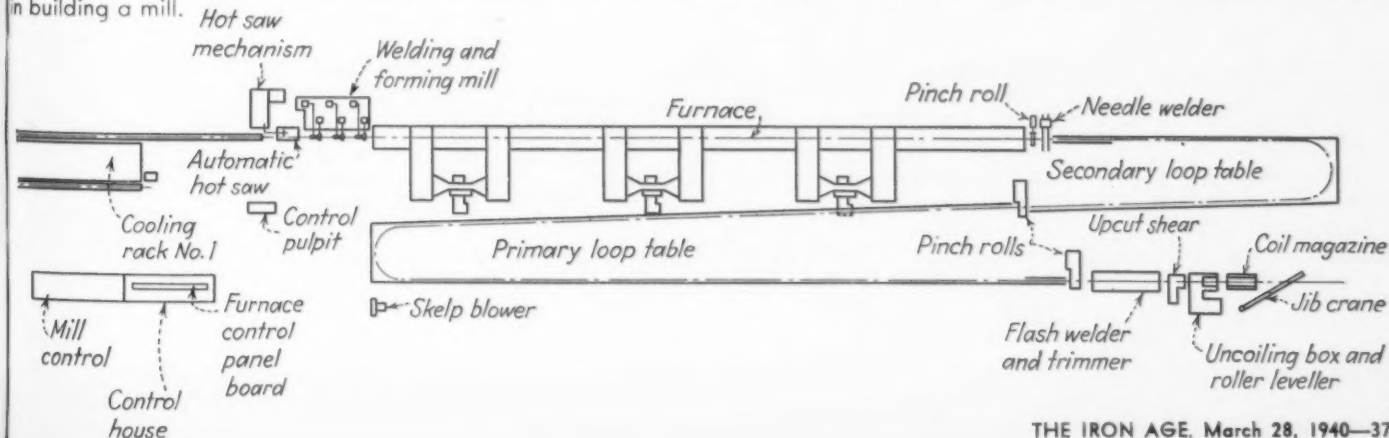
In a normal operation of a Fretz-Moon plant, the coils of skelp are delivered at the beginning of the mill where they are either handled on reel

posts or in a coil box. From this coil box, they pass through a roller leveler which levels out the skelp and from there it is delivered to the end welder.

At this point the tail end of the preceding coil is welded to the leading end of the next coil. After the end weld is made, the roller leveler quickly pays out the entire roll of skelp or a sufficient quantity to fill up the loop table in order to provide adequate skelp for the next delay when a subsequent weld is made. Meanwhile, the skelp on the loop table is being drawn through the heating furnace at a steady rate by the welding and forming mill.

While some of the existing mills have what is known as a single loop arrangement, more recent installations

continuous butt weld pipe mill. Shown in this picture is the double loop arrangement, used where the problem of space is in building a mill.



in some cases utilize what is known as the double loop arrangement. According to students of the continuous weld process, wherever possible a single loop should be employed but where limitations in length are found, the secondary loop arrangement appears to be a reasonable and successful answer to the problem of restricted space for a mill.

The furnace for heating the skelp to welding temperature does not follow conventional furnace design, construction, or operation. It is literally a blow torch from a functional standpoint because cold skelp entering the furnace must be and is brought up to welding temperature in less than 30 sec.

Since the first experiment on the continuous butt weld process, furnace length has gone from the small 10-ft. job to the latest one of 165 ft. in length. In the furnaces now being constructed, domestic carborundum recuperators are being used instead of the metallic recuperators previously imported from Germany, and the second Spang Chalfant unit is being equipped with Salem Engineering Co. domestic-built metallic recuperators.

A brief description of the furnace in the initial Spang Chalfant installation will serve to explain the fundamentals in this type of furnace. An article on this phase of the continuous butt weld mill appeared in THE IRON AGE, July 28, 1938, page 43.

The pre-heating chamber of the furnace is heated by spent flue gases from the hotter portion of the furnace instead of going through an additional recuperator and from there the strip enters the high heating portion of the furnace proper. In the installation described, heat is applied to the strip by 274 small burners firing through both side walls of the furnace in such a manner that the flame impinges on the edges of the skelp. As the strip moves forward, the edges are heated to just below welding temperature. Subsequently, as the strip emerges from the furnace, jets of air are impinged on the edges of the skelp, thus increasing the temperature 100 to 200 deg. F. or up to the proper welding temperature.

The skid supports for the skelp in the heating chamber consist of a number of water-cooled pipe extending between the two walls and bent in

such a shape that the skelp tends to keep to the center of and away from the bottom of the furnace.

In this particular installation fuel for the burners is natural gas of approximately 1100 B.t.u. per cu.ft. thermal rating, and the high flame temperature and rapid combustion are developed by the use of recuperators which preheat the combustion air to approximately 900 deg. F. By-product gas and fuel oil are being used in some other recent installations.

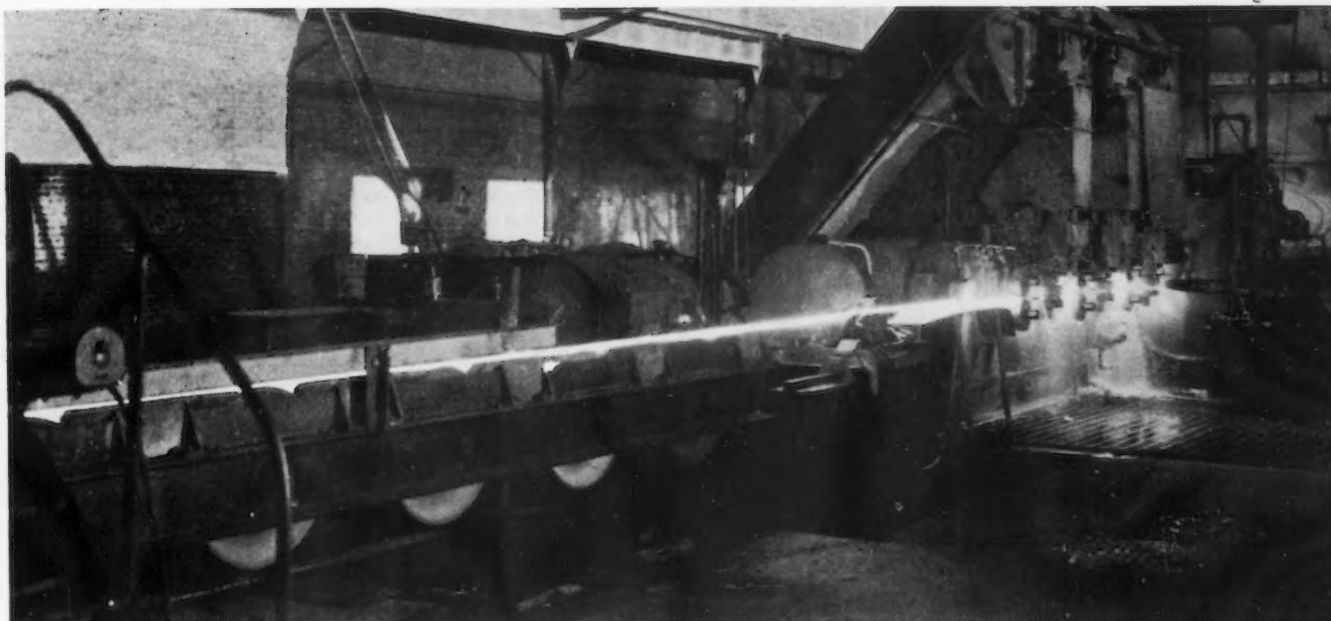
Temperature in the discharge end of the furnace is approximately 2700 deg. F. while the emerging strip is approximately 2400 deg. F., although the edges of course are hotter. These temperatures are recorded by means of a pyrometer, with the recording instrument mounted on the panel board. A great deal of additional control and recording equipment is used to maintain operating conditions and records of operations with reference to the recuperators, hot air, etc., which have to do with furnace economy and operating department responsibility.

A great part of the scale on the pipe is caused by an air blast at the welding mill and is, therefore, deposited

Continuous Butt Weld (Fretz-Moon) Pipe Mills in the United States and Elsewhere

Company	Location	United States		Estimated Annual Capacity, Tons	Speed, Estimated Ft. Per Min.
		Construction Started	Size Pipe Rolled		
Fretz-Moon Tube Co., Inc.	Butler, Pa.	1922	1/8 to 1 in.	42,000	Depends on size pipe in all cases. Maximum on 3/8 in. to 3 in. mill is 400 ft. per min. Maximum on 1 in. to 4 in. mill is 300 ft. per min.
Fretz-Moon Tube Co., Inc.	Butler, Pa.	1924	3/8 to 2 1/2 in.	75,000	
Spang Chalfant Co.	Etna, Pa.	1938	3/8 to 3 in.	85,000	
Spang Chalfant Co.	Etna, Pa.	1939*	1 to 4 in.	150,000	
Republic Steel Corp.	Youngstown	1939	1/2 to 3 in.	85,000	
Republic Steel Corp.	Youngstown	1939*	1 to 4 in.	150,000	
Youngstown Sheet & Tube Co.	Youngstown	1939	1/2 to 3 in.	85,000	
Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	1939*	1/2 to 3 in.	85,000	
Bethlehem Steel Co.	Sparrows Point, Md.	1939	1/2 to 3 in.	85,000	
Bethlehem Steel Co.	Sparrows Point, Md.	1939*	1 to 4 in.	150,000	
Wheeling Steel Corp.	Benwood, W. Va.	1939*	1/2 to 3 in.	85,000	
Total capacity, United States plants				1,077,000	
		Foreign			
		Construction Started	Size Pipe Rolled		
Stewarts & Lloyds	Corby, England	1933	1/8 to 1 in.	42,000	
Stewarts & Lloyds	Corby, England	1933	3/4 to 2 in.	85,000	
Stewarts & Lloyds	Corby, England	1933	3/4 to 2 in.	85,000	
Stewarts & Lloyds	Australia	1933	1/8 to 3 in.	42,000	
Vereinigte Stahlwerke	Mulheim, Germany	1932	3/8 to 3 in.	85,000	
Vereinigte Stahlwerke	Mulheim, Germany	1933	3/8 to 3 in.	85,000	
Vereinigte Stahlwerke	Mulheim, Germany	1933	1/8 to 1 in.	42,000	
Page-Hersey Tubes Ltd.	Welland, Ont., Canada	1939	1/8 to 3 in.	85,000	
Total capacity, foreign plants				551,000	
Total world capacity				1,628,000	

*Now under construction (will begin operation in April-May, 1940)



A GENERAL view showing the furnace, forming, and welding rolls, automatic hot saw and runout table.

outside of the furnace. Scale formed within the furnace proper is deposited near the discharge end and the furnace bottom is especially designed so the slag will accumulate at points where it may be conveniently removed through pockets with specially designed doors and spouts. The roof of the furnace is made in sections, each of which consists of a cast steel bung lined with high quality brick. The bungs are removable to provide free access for maintenance purposes.

The blast of air played on the edges of the skelp as it leaves the furnace not only causes an increase in temperature due to oxidation as described above, but also removes loose scale from the welding edges of the skelp. The skelp passes through six pairs of grooved rolls arranged in three sets, each set consisting of a pair of vertical and a pair of horizontal rolls.

The first pair of rolls forms the skelp into an oval with the edges still apart. The second pair of rolls brings the pipe into an approximate round with the edges into contact with each other and the welding operation takes

place here. Subsequent rolls furnish traction sufficient to insure uniform travel of the skelp through the furnace.

After the welding mill is the flying hot saw which is synchronously tied in with the speed of the mill so that it automatically cuts pipe into the exact desired lengths. It is interesting to note that this important piece of equipment which, incidentally, has resulted in standard warehouse lengths of 20 ft. or any other length up to 55 ft. is a far cry from the bolt clippers used in the first experimental mill.

The finished pipe, after being cut to lengths, passes over a small cooling rack and is then transported to a descaler consisting of three pairs of rolls, where the scale is loosened both externally and internally. There is, of course, very little internal scale to be removed in this process. The pipe is then conveyed to a large cooling rack from which it is carried to a finishing department where it is subsequently straightened, tested, and finally threaded. Scale loss in the entire oper-

ation approximates $3\frac{1}{2}$ per cent and, as referred to before, is mostly caused by the air blast at the end of the furnace. Other losses, including finishing loss, total about $1\frac{1}{2}$ per cent, making a yield of approximately 95 per cent into finished pipe from skelp received at the cold end of the mill.

The equipment for the larger sized pipe up to 4 in. in diameter is substantially the same as that utilized for the smaller sizes except that necessary and proper changes have been made in the mechanical equipment. Furnace research is being carried out continually and improvements are being studied and incorporated. Especially is the latter true with respect to the uncoiling and welding of the strip and the straightening, sizing, and polishing of the finished pipe.

It is significant that after 100 years of conventional butt weld pipe making in the world, it has required only the space of a very few years to lay down in the United States 10 absolutely modern plants, once the merits of the continuous weld process had been accepted.

BROACHING OF RIFLE PARTS

RECENTLY, the Oilgear Co., Milwaukee, built a series of 26 machines fully equipped with tools and fixtures for broaching a wide variety of internal and external surfaces on ordnance parts. Round, oval and form holes, keyways and splines in carbon steel rifle parts are finish broached on vertical pulldown broaching machines, while external flat, step, arc and form surfaces are finish broached on single and double slide vertical surface broaching machines.

Both types feature dual push button control with selector switch for manual, semi-automatic or full automatic operation, positive lubrication of work and tools and variable broaching and return speed. The vertical pulldown machines incorporate automatic tool handling. No clamping, threading of work over tool shank, handling of tool puller keys or complex fixture are necessary. Parts are merely laid on the simple fixture and roughly located, the tool centralizing the part before broaching.

For the external operation, fixtures are mounted on straight in and out shuttle tables, the motion of which is interlocked with the tool slide operation. Micrometer stops are used for precise positioning of the shuttle tables and hence the work in the broaching position. Automatic clamping and unclamping of the work is employed wherever possible.

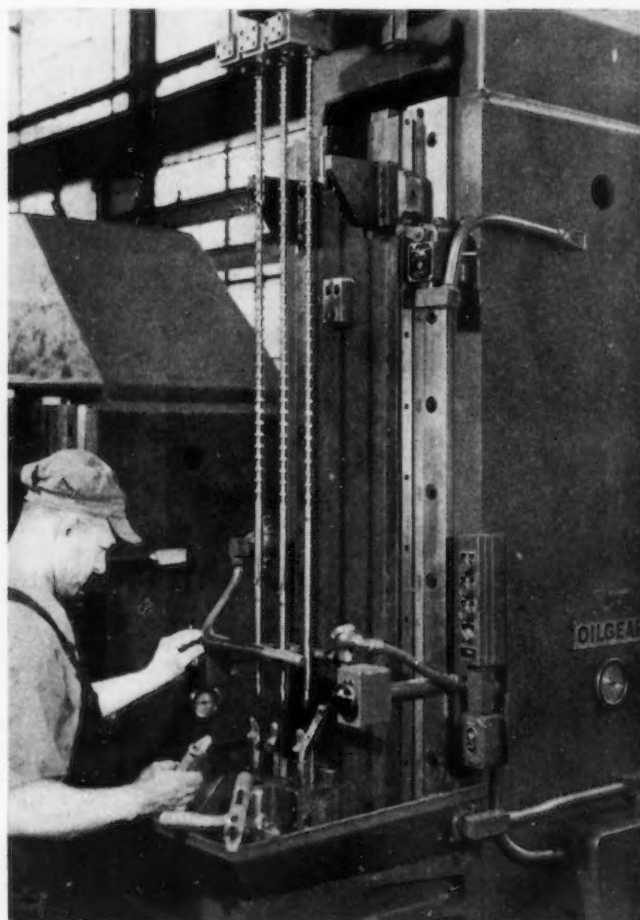
Typical of the machines supplied for this ordnance work is the group pictured for finishing the forged carbon steel rifle receiver piece. Altogether on this part there are five

operations performed in four machines, three of which are shown.

First operation on the rough piece is to finish broach two opposing slots 15/32 in. wide and 0.162 in. deep the full length of the receiver. Because one wall is considerably thinner than

the other, it is necessary to keep the tool side thrust low so as to prevent breaking out of the thin wall. Hence the operation is performed in three draws, in a three station fixture on a vertical pulldown machine, Fig. 1. One piece is completed at each stroke of

FIG. 1 — Finish broaching of two opposing slots is done in three stages in this Oilgear type XP-20 x 54-in. stroke vertical pulldown machine. Cutting is done at a speed of 30 ft. per min., the return speed being 80 ft. Production: 150 parts per hr.



the machine, the uncompleted parts being moved one position to the left.

Fixture is a simple shuttle type for roughly locating the parts. Tools are of a special cutter bar type with double tongues for the slots and arranged on both ends for automatic handling. In operating the machine, the attendant roughly locates the three parts in the fixture and slides it into the broaching position where a small arm contacts a switch and starts the cycle. The tools automatically are threaded through the work, grasped by the pullers and are drawn through the parts. At the end of the downward stroke, the cams on the tool slide automatically move the shuttle fixture outward to the unloading position and the broaches are returned to their receivers, as shown in the photograph.



The second and third operation are performed on a dual slide pulldown machine with duplicate sets of tooling and fixtures. Each shuttle slide has two fixtures, one a manual weighted lever type locator used in conjunction with a spring loaded jaw clamp to hold the rifle receiver part in a hori-

FIG. 3—Three pieces are broached at a time, giving a production of 600 finished pieces per hr. on the fourth operation on the rifle receiver piece, performed on an Oilgear type XS-12 x 30-in. stroke single slide surface broaching machine. Both sides of the piece are broached with pairs of angular slab tools. Fixture is a simple faceplate type with pins for locating the threaded end of each receiver and spring loaded, shaped faceplates to support the body of the part. No clamping is necessary.

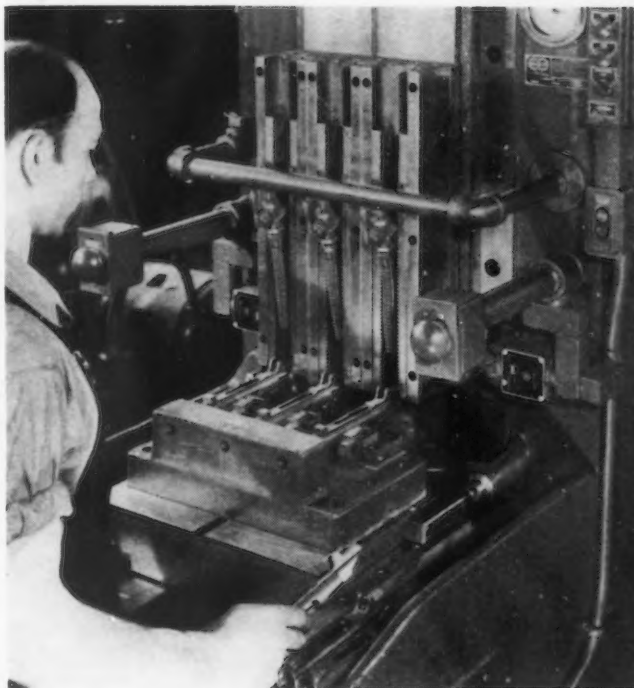
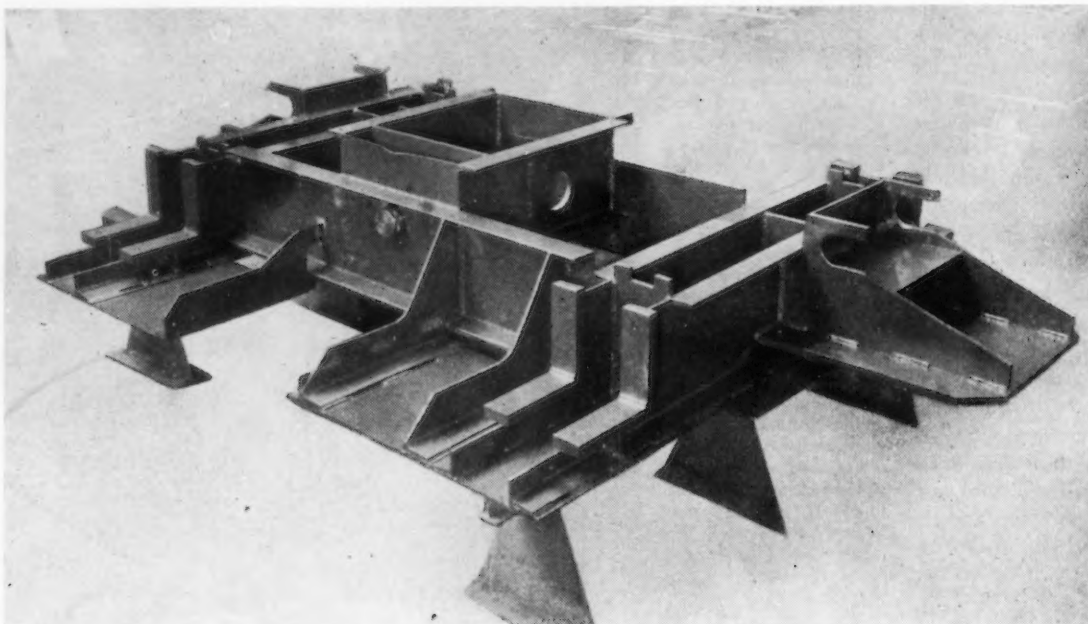


FIG. 2—The second and third operations are performed on this Oilgear type XD-30 x 66-in. stroke double slide surface broaching machine. There are two fixtures on each shuttle and two sets of tools on each slide. Production: 180 pieces per hr.

zontal position dual opposed tool inserts broach both sides of a $\frac{3}{4}$ -in. tongue while 42 individual tooth sections spaced above them in a long tool holder finish broach a $\frac{5}{16}$ -in. radius arc. Upon completion of operation No. 2, the piece is transferred to the second fixture for operation No. 3. While one shuttle slide is advancing into the broaching position, the other is moving out to the unloading position. The spring loaded clamps are actuated automatically during these shuttle motions.

The fourth operation, illustrated in Fig. 3, is the simple one of removing 0.120 in. of stock on each side of the rifle receiver at one end. High production is attained by using a three station, quick loading fixture. Even greater production, 750 pieces per hr., is attained on the fifth operation, not illustrated, through the use of a four station fixture and four sets of identical tools on the slide. This operation, which involves the broaching of key slots 0.225 in. wide by 0.280 in. long, necessitates threading the tools through the work, an operation done automatically so that the attendant does not have to handle the tools. The tools are a special cutter bar type with both ends arranged for automatic tool handling. Fixture is a simple stationary type with forms to receive the parts and roughly locate them in place for the broaching operation. An Oilgear type XP-12 x 30 in. stroke vertical pulldown machine is used arranged for semi-cycle operation.

zontal position; the other, a jaw type spring loaded mechanism for holding the part and an arbor insert in a vertical position. In the first position, a short shear type tool is used to broach a surface $\frac{3}{4}$ in. wide by $4\frac{3}{4}$ in. long and a right-angle surface $\frac{7}{16}$ in. high and $\frac{3}{4}$ in. deep, and in the second



WELDED trolley frame for Tiger mill-type crane in process of construction. All steps in production, from material supply to actual welding and finishing, proceed according to a predetermined schedule.

WELD- FABRICATION ESSENTIALS

By LESLIE S. MCPHEE

*Welding Supervisor, Whiting Corp.,
Harvey, Ill.*

IMPORTANCE of design for welding, of proper preparation of material to be welded, and of proper set-up assembly and tack welding are emphasized in this article, from a paper by Mr. McPhee at the recent 20th annual meeting of the Ameri-

can Welding Society. The production scheduling, or co-ordination of the various steps in weld-fabrication, at the Whiting Corp. plant is also outlined. The paper as presented included brief comments on materials and on selection of personnel.

BEFORE starting the actual welded fabrication of a product, consideration should be given to several items which will tend to make the fabrication process a success or failure.

Of prime importance is "engineering design." If welding is eventually to reach its deserved level, something must be done to acquaint all designers and engineers with the potentialities of this "science of welding," and to make them fully cognizant of those potentialities and requirements. Here the psychological angle presents a considerable problem in that the direction of flow of information must be

reversed, that is, the engineer must obtain from somewhere the information that the shop man has already obtained through experience and research.

Few engineers in authoritative positions today have had time to keep abreast of the rapid progress of welding, the development of electrodes and welding machines, and the experiences of those of us who are in direct contact with those items. It is not difficult, then, to understand their wariness in accepting the welding engineer's enthusiasm unquestioningly.

On scrutinizing the detail drawings in many industries, it becomes obvious

that the operator and practical welder have advanced beyond the designer with regard to their share of the problem. Too often the design is made with a riveted structure in mind, then the rivet size and spacing is omitted, and a note is added "weld through-out," and that is called a welded design. When this is called to the attention of the draftsman the answer is usually; "Well, the welding supervisor knows more about the strength of his welds than I do," which is probably true, but this is a deplorable condition. Although the welding supervisor usually does know the strength of the welds, he should not be expected to know the magnitude of the stresses developed or the theory of their application. Therefore it is imperative that all information relative to welding be on the drawing, even to the smallest detail.

Fabricating Equipment Needs

Having considered design and material, the next thought is the equipment necessary for the preparation of the material for welding. Today one of

the most important, if not the most important, pieces of equipment is the flame-cutting machine. This is a tool with flexibility of application and capacity practically unlimited. Whether the material is 1/16-in. or 6-in. thick, flame preparation is applicable.

If the material to be fabricated is other than the standard run of structural steel such as nickel, copper or stainless, of course a shear and plate planer are necessary.

Next in order of importance is a modern press brake. While this is a comparatively expensive piece of equipment, it is imperative to the economy of weld design. By its proper use, the designer is enabled to eliminate a large number of corner welds, thereby reducing the cost and at the same time improving the appearance of the finished product. Forming and bending which were practically impossible with the old style bending brake are every day occurrence in a portion of the time with this machine, not to mention the superior results obtained.

Plate and bar rolls are presumed to be a part of every structural fabricating plant, the main requisite being that there be two sets: one large enough for the maximum demand and one small enough for the minimum. While a furnace for heating material too heavy for cold forming is advantageous, it is not an absolute necessity in view of the production methods and cost reductions accomplished by the mills. While a preheating oven is desirable for the welding of the higher carbon steels (above 0.30-0.40 C) and necessary for stress relief of heavy pressure vessels, it is not necessary for the general run of welding if the filler metal is of high ductility.

Preparation of the material to be welded is of as great importance from a physical as well as an economic standpoint as the welding itself. Where this operation is accomplished in a separate structural department, which is usually the case in the older plants where the welding has developed from a maintenance tool to a major production department, proper preparation is undoubtedly a bone of contention. This is probably due to the fact that the persons preparing the material have never had the opportunity of welding a joint, much less one that was poorly prepared; they therefore cannot be expected to share the viewpoint of the welder nor appreciate the justice of his complaints. The preparation of the material rates next to design in the con-

sideration of economy, distortion or locked-up stresses and last, but not least, the morale of the welding operator.

When preparing the joints in materials under 3/4-in. thick, it is doubtlessly more economical to use the plate planer, as a closer control can be held over the contour and tolerance of the bevel or groove. On materials over 3/4-in. thick, however, economy practically forces the use of a beveling or scarfing torch.

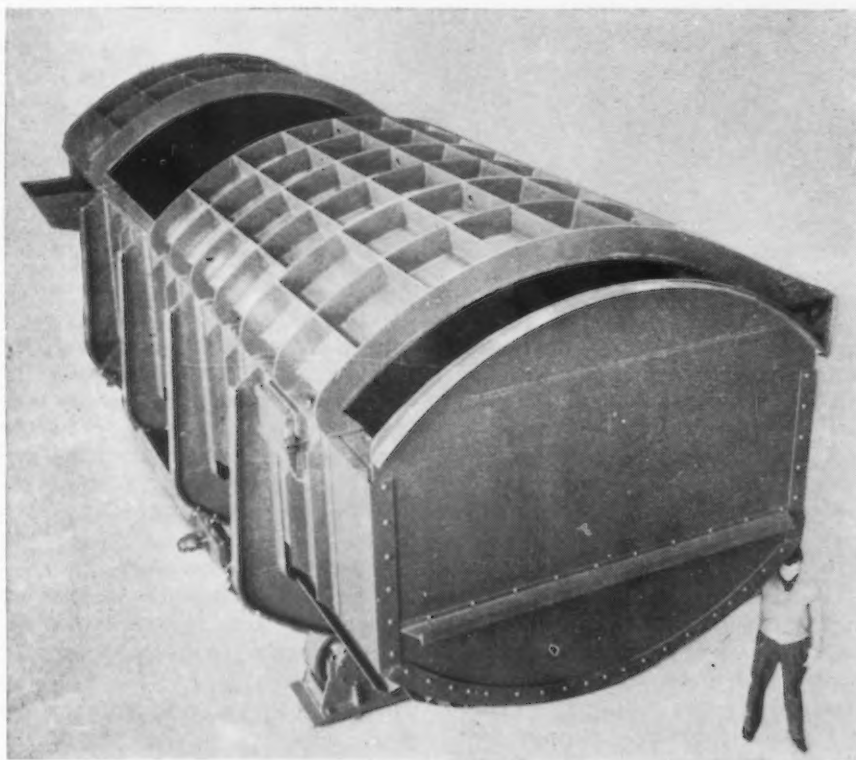
The next item in sequence and importance is set-up assembly and tack welding. For this operation, personnel again plays a major part and the most satisfactory person for this operation is not merely a structural assemblyman but an experienced welder with the ability to read drawings. This is true because of the fact that a welder is fully cognizant of what a poor fit will mean to the final cost. He also has a working knowledge of distortion and can generally predict which way and about how much the parts will shrink. He realizes the disadvantages of tacks that are too large and just how small they can be and still be expected to hold.

After the parts have been assembled and tacked, the next thought is to get them into the most economical

as well as the most convenient position for welding, which is naturally the flat or down-hand position and which necessitates positioning equipment, manipulators, tank rolls, cranes, hoists, adjustable scaffolding, etc. This equipment pays the highest form of dividends relative to cost reduction, stress distribution, appearance and a partial elimination of the human element.

Jigs and fixtures for parts that are to be duplicated by welding are no place to try to save money. A few dollars more spent on a jig or a fixture is a sure-fire means of increasing the profit from that equipment. For a quality product, the men—exceptional though they may be—must have quality materials and equipment to start with.

Although there may be average headroom under traveling cranes, it may be of decided advantage to have a pit at one end of the shop the full width of the building and 20 ft. deep. This permits assembling large bodies in a vertical position for tacking, thus eliminating a great deal of hard labor and jockeying of parts to get them in position, at the same time affording an opportunity of working on all sides of the vessel at the same time in perfect safety.



CRADLE-TYPE holding furnace of 150 tons capacity—a combination of welded and riveted construction. It is approximately 40-ft. long and 6-ft. wide, and weighs 85,000 lb.

Having looked at the different necessities for fabrication, there may be some question as to how they are accomplished and coordinated; so, a job could be followed from the engineering department to the freight car.

After the drawings and bills of material have been completed in the engineering department, the first operation is to determine the source of the

of persons having complete knowledge of each operation performed in every manufacturing department in the plant and it is their duty to study the drawings and break each unit down into its component parts and route them for their many operations, giving the date of completion in each department.

A requisition for the material is attached to the route card and is de-

second operation would be performed. The third operation would be rolling and delivering to the weld shop. The fourth operation would be to flame-cut the flange; the fifth, to weld flange and neck and deliver to the lathe; and the sixth to face and deliver to the layout department for bolt holes. The seventh operation would be to lay out bolt holes. The eighth would be to drill and deliver to weld department, and



VAPOR heads for one of the largest LTV black liquid evaporators, weld-fabricated by the Swenson Evaporator Co., subsidiary of the Whiting Corp. This vessel is made from $\frac{5}{8}$ -in. plate and is entirely welded.

material. This is done by the stores department which takes the original bill of material before duplication and marks each item, showing whether it is carried in stock or is to be purchased. When this operation is completed the bills are duplicated and a copy of each page delivered to the department concerned.

Upon receipt of their bills and drawings, the purchasing department immediately orders all materials so designated and follows their production until delivery into the plant. As soon as a vendor furnishes a delivery date for the ordered material, the production department schedules the shipping date to the routing department.

The routing department is composed

of persons having complete knowledge of each operation performed in every manufacturing department in the plant and it is their duty to study the drawings and break each unit down into its component parts and route them for their many operations, giving the date of completion in each department.

A requisition for the material is attached to the route card and is delivered to the department performing the first operation. Here the material is drawn from stock and marked with the job number and part number. As this operation is completed, the material is moved to the next department specified on the route card.

The route card is then turned in to the operations office where the completion of the operation is noted on a duplicate route card and then delivered to the next department for fabrication.

In the case of a neck for a tank, the first operation would be layout in the structural department. This would turn the requisitions into the stores, receive the plate, lay out for shearing and send it to the shears where the

ninth operation to assemble and weld in place and return the route card to the operations office, showing completion.

After each operation, the route card is turned into the operations office for designating on the duplicate route card the status of completion and location of the part, thereby enabling the production department to obtain the exact status of the job at any time.

For large jobs, for those large enough to necessitate 10 or 12 cars for shipment and two or three weeks for erection, the control of the sequence of completion of each different unit is entirely necessary to facilitate erection in the field and eliminate demurrage charges.

WHAT'S NEW IN HEAT-TREATING AND PROCESS CONTROL APPARATUS

By FRANK J. OLIVER

Associate Editor, *The Iron Age*

A SIMPLIFIED design of air-operated potentiometer recording controller has been introduced, and a radiation type vacuum thermocouple has been developed for use in processing materials at high temperatures in protective atmosphere furnaces. Several valves designed for the accurate response to the demands of a control instrument are pictured. Also illustrated are a number of new furnace designs, including two salt baths heated by current passing through the bath itself. Other apparatus recently placed on the market includes an oxygen analyzer, a dilatometer, flow meter for measuring fluids under high pressure, high vacuum gage, and a gas-fired air heater for low temperature furnaces.

IN order to obtain a more sensitive detecting mechanism than that required for recording, a single, calibrated detecting cam is used in a new series of air-operated potentiometer recording controllers, announced by the *Foxboro Co.*, Foxboro, Mass. This cam will sense deflections of the galvanometer pointer of less than 0.0001 in. and by positioning a friction roller the cam positively determines the movement of the integral slide wire contact. The latter, the recording pen and cam follower actuating the control cam are assembled as a unit on the same rigid carriage, eliminating the need for linkages, belts or gears to transmit the position of one unit to the other. Guaranteed accuracy is one-quarter per cent of scale range, obtained through this coordination of measuring, recording and controlling operations.

The control system is affixed directly to the shaft of the cylindrical

control cam, and the rotary motion of the control-cam shaft makes for extreme simplicity in providing for the type of control required by application conditions. Construction of the unit is such that the entire mechanism can be pulled forward out of the case, making all the moving parts highly accessible and allowing the use of anti-vibration rubber cushioned mountings within the case. Routine adjustments for standardizing the circuit are made without opening the door.

Pre-Act Control Feature

IN addition to the conventional proportional response and automatic reset forms of control, a third process control effect, known as pre-act, has been introduced in a redesigned line of Fulscope air-operated recording and indicating controllers for temperature, pressure, rate of flow and liquid level, announced by the *Taylor Instrument Cos.*, Rochester, N. Y. Pre-act is a

supplementary control which makes control valve corrections according to the rate of control point deviation. In the case of sudden disturbances in the process, there is an immediate and relatively larger control valve action than would occur otherwise. Over-peaking or oscillating is said to be greatly reduced, and the operation of the equipment is stabilized after a change in set point or when it is started up. The automatic reset feature, which compensates for changes in load, is located in the instrument case and is fully adjustable over a much wider range than previously.

The simplified air system includes an improved air relay valve with precise sapphire orifice, removable stainless steel nozzle, and inbuilt metal disk auxiliary air filters supplementing the large external filter. The instrument operates on 20 lb. air supply. These Fulscope controllers are available in five standard types, with fixed or adjustable sensitivity; with adjustable sensitivity and automatic reset, with pre-act alone, or combined automatic reset and pre-act.

Radiation Type Thermocouple

A NEW radiation type vacuum thermocouple for use wherever high sensitivity and rapid response are needed has been announced by *General Electric*. This thermocouple is designed to fill a specific need created by the development and use of controlled

protective-atmosphere furnaces for processing materials at high temperature. Possible applications include temperature measurement and control in brazing, heat-treating furnaces, infra-red drying and solar radiation.

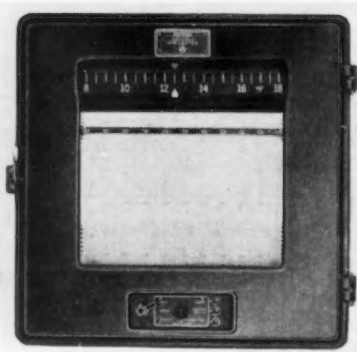
Enclosed in a vacuum, the thermocouple consists of a very thin filament of two different metals, blackened on one side. Radiant energy acting upon the thermocouple produces an electromotive force which is transmitted to a millivoltmeter or potentiometer which can be calibrated in degrees. The device may be mounted either temporarily or permanently upon a furnace, the only accessory needed being a closed-end tube in the furnace to prevent fogging of the lens and to form a target upon which to sight the thermocouple.

Since the thermocouple has no physical contact with high-temperature furnace parts it will not be damaged by high temperatures. Temperatures from 300 to 1500 deg. C. can be read on a millivoltmeter or potentiometer. Still higher temperatures can be measured by the addition of protective screens or filters between the thermocouple and the heat source.

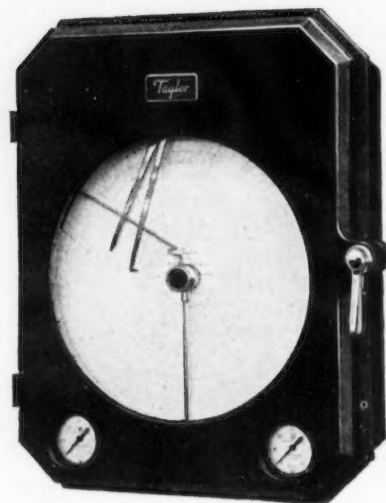
Oxygen Recorder

LAATEST development in sampling and recording equipment for oxygen measurement and control is the M.S.A. oxygen recorder announced by the *Mine Safety Appliances Co.*, Brad-dock, Thomas & Meade Streets, Pitts-burgh. The instrument can be used to control oxygen content in chemical processing, to measure oxygen content of natural, coke-oven and blast fur-nace gases, and to measure excess air in products of combustion from gas, coal and oil burners.

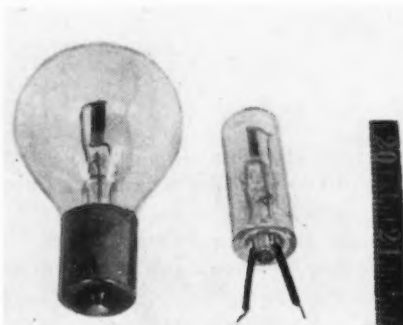
The analyzer is principally a voltaic cell, made of hard rubber, containing an electrolytic solution which is a strong reducing agent and two copper electrodes. One electrode is in the form of a bar, completely immersed; the other, in the form of a ring. This ring slowly revolves, with part of its periphery submerged in the electrolyte and the remainder exposed to a sample of gas which flows through the cell. Oxygen in the sample gas reacts with the copper to form copper oxide and with continued rotation this copper oxide enters the solution. A potential is set up between the copper oxide and the copper electrode that is propor-tional to the amount of oxygen in the sample. This potential is not in-fluenced, however, by the rate of sample flow. The result is read on a



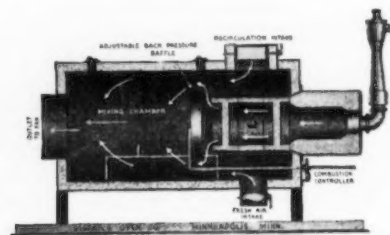
O PEN-and-shut action or throttling action, with or without automatic reset, is avail-able in the air-operated models of the new series of Foxboro potentiometer recording controllers, which incorporate an improved detecting mechanism, a new integral record-ing and control mechanism and a new con-trol system to provide maximum flexibility of use.



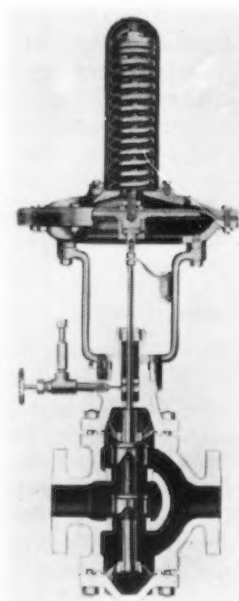
A NEW process control effect, known as pre-act, which makes control valve cor-rections according to the rate of control point deviation, is incorporated in the redesigned Taylor Fulscope controllers, of the air-oper-ated recording and indicating type.



TWO sizes of the new G-E radiation type vacuum thermocouples. On General Elec-tric production lines, this new instrument has been found particularly useful in controlling temperatures of rapidly moving objects and materials on conveyors through furnaces.



SECTION through a Despatch DG-250 di-rect gas-fired air heater, showing the double walled body and insulation, burner, refractory combustion chamber and adjust-able back pressure baffle for controlled com-bustion. The fresh air and recirculation air intakes may also be seen.

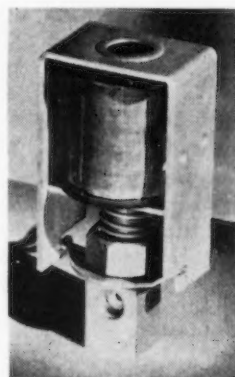


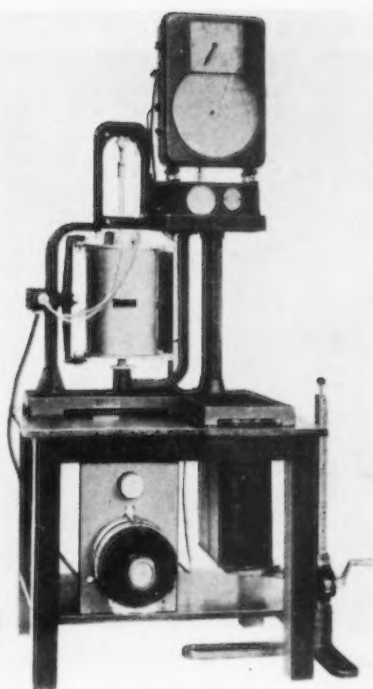
AT LEFT

CCROSS-SECTIONAL view of the new Foxboro line of Stabilflo controlled valves designed for accurate response to the de-mands of a control instrument. The valve has a range of 50 to 1.

AT RIGHT

AN inexpensive solenoid operated valve has been designed by Gen-eral Electric for general application in the control of air, oil, water and gas, although particularly adapted to the requirements of the heating and air-conditioning industry. It may be used as an oil shutoff for oil burner service, pilot gas control for gas burners, air control for compressed air devices or for evaporative cooling equipment. It is designed to be incorporated into an assembly and hence has no inclosure.

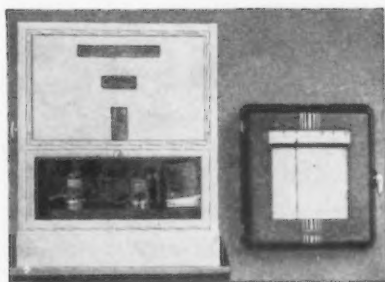




ROCKWELL-BRISTOL dilatometer, model RB, designed by Stanley P. Rockwell and sold by the Bristol Co., Waterbury, Conn., is a direct reading dilatometer which both indicates and makes an ink record of time-dilation and temperature-dilation changes simultaneously during heating and cooling cycles of ferrous and non-ferrous metals and other materials of rigid form. Temperatures are recorded on a Bristol Pyromaster potentiometer with 12 in. round chart, and the time element is recorded by a separate pen through a Telechron clock mechanism.

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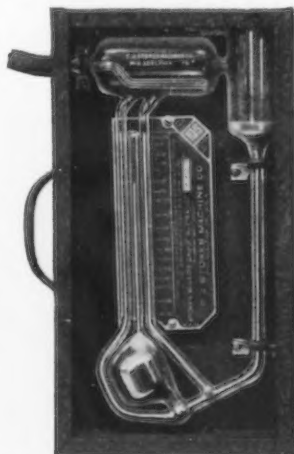
NEW mechanical flow meter of the ring-balance type for metering steam, water, oil, gas and air at static pressures up to 1000 lb. per sq. in., has just been announced by Republic Flow Meters Co., Chicago. This meter will give full scale readings on differentials as low as 3 in. of water. The meter is housed in a rugged steel case suitable for exposed locations. It is easily adjusted by changing a calibrating weight, has a 12 in. evenly graduated chart, and is furnished with any combination of indicator, recorder and cyclometer type integrator.



THIS new M.S.A. oxygen analyzer and recorder gives precise measurements of oxygen concentrations in other gases from 0 to 15 per cent and can be calibrated for any range within these limits.



AIR-GAS Ratiotrol for control motor operation produces an air-gas mixture of constant proportion, making both fluids interdependent while passing through an aspirator and an atmospheric regulator respectively. By means of an adjustable port, all possible over-riding of temperatures at low temperature settings is said to be eliminated. Made by the North American Mfg. Co., Cleveland.



PORTABLE high vacuum gage with a range of 0 to 700 microns and calibrated down to 0.1 micron, recently introduced by the F. J. Stokes Machine Co., Philadelphia. Operating on the McLeod principle, it is similar to the Stokes gage introduced a year ago, but is slightly larger and heavier although it covers a narrower range for reading more accurately. With this gage, single readings can be taken in a few seconds and successive readings in not more than 10 sec. each. To make a reading, the instrument is merely rotated from the horizontal (evacuated) to the vertical position. Gage tubing is Pyrex glass.

specially calibrated recording potentiometer.

Air-Gas Proportioner

CONSTANT proportion of the air-gas mixture is claimed at all settings of the new air-gas Ratiotrol offered for control motor operation by the North American Mfg. Co., Cleveland. To assure such operation, the gas pressure is reduced to atmospheric by means of a special regulator and part of the energy in the air stream is used to aspirate the gas so that a fixed relationship is in existence at all times between the quantities of the two fluids flowing. The aspirator possesses a measure of flexibility that makes it possible to obtain some corrections for capacities, varying pipe resistances, etc., without altering the installation itself.

The control valve has an adjustable port that can be set to insure effective control of the air over the whole motor operating range, together with an external by-pass to furnish air at blower pressure to an auxiliary diaphragm on the atmospheric regulator when the control motor goes to the shut-off position. Full blower pressure thus becomes effective in seating the regulator valve and gas flow ceases completely, eliminating all possible over-riding of temperatures at low-temperature settings. An adjustable port air valve has been selected for this assembly since this valve has an external adjustment which allows matching of the valve port with the burner port in such a way that control over its whole operating range can be secured.

Controlled Valves

EQUAL percentage increases in flow for equal amounts of valve lift are obtained beyond the initial clearance flow of 2 per cent in an improved line of Stabilflo controlled valves designed by the Forboro Co. for accurate response to the demands of a control instrument. The unit is equipped with a 50:1 range V-port plunger of high lift so as to produce a valve with wide range flow characteristics and high sensitivity. In addition to this V-port plunger, a parabolic plug type and a wide ratio turned plug type are also available for exceptional control applications.

One-piece bonnet and stuffing box assembly is joined to the valve body with a tongue and groove connection, assuring alignment. Use of a deep, lubricated stuffing box and polished stainless steel valve stem reduces friction to a minimum. Plungers of the

valve are also provided with top and bottom guides of stainless steel. Accurate and efficient operation of the complete line of valves is provided by the Stabilflo floating power motor, which has sufficient excess power to meet all operating conditions.

Direct Air Heaters

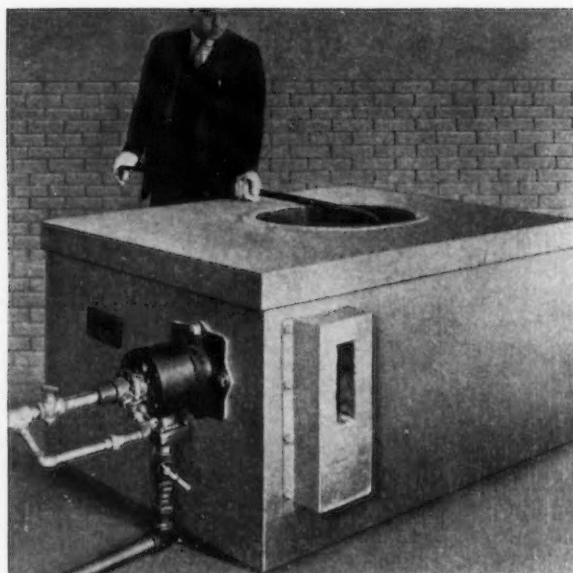
A RECIRCULATING gas-fired air heater with controlled combustion has been introduced by the *Despatch Oven Co.*, Minneapolis. Made in a range of capacities from 75,000 to 1,000,000 B.t.u. per hr., this heater is recommended by the maker for application to tempering and drawing furnaces, normalizing furnaces, solder sweating ovens, bluing ovens, and finish baking and drying ovens with a maximum temperature of 1250 deg. F. In order to give proper combustion under varying operating conditions and using various types of gases, an adjustable back pressure baffle is placed in front of the primary combustion chamber. This alloy steel plate is mounted on guide rails and its position can be varied by means of a threaded rod that runs to the front of the heater. As hot products of combustion leave the refractory chamber, they are diffused by this baffle plate and are diluted by recirculating and fresh air that has been taken into the heater. In this manner, back pressure set up in the combustion chamber may be positively regulated, thus maintaining proper combustion temperature, induced draft and maximum combustion efficiency under each operating requirement. The resulting mixture is then taken by an air circulating fan and forced into the oven or furnace ducts.

The amount of recirculation or fresh air taken into the heater is controlled by independent dampers and this air, from either source, must wipe the outside of the hot combustion chamber, so becoming partially heated before mixing with the hotter combustion gases. With this type of combustion control, the bad odor of unburned gases is said to be eliminated and the efficiency greatly increased.

Shaft Tempering Furnace

TWO sizes of electric furnaces specifically adapted to the tempering and straightening of shafts have been developed by the *Cooley Electric Mfg. Corp.*, 215 S. Senate Avenue, Indianapolis. Both have doors 18 in. wide by 13 in. high and are 68 and 30 in. in depth respectively. The larger furnace is illustrated. The furnaces

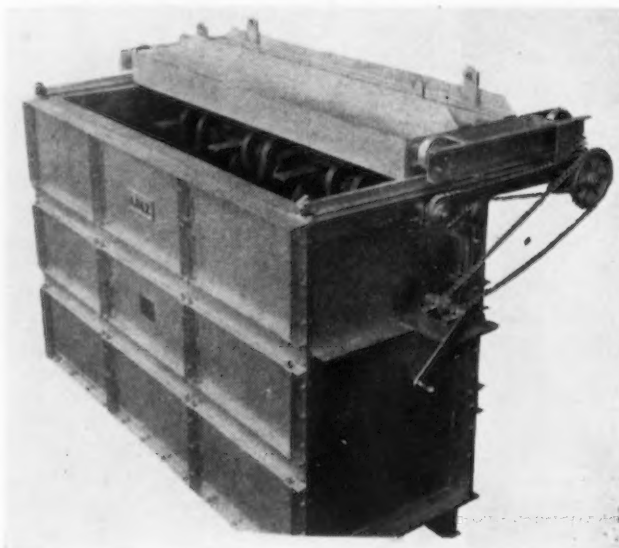
HOLDEN pot furnace with a specially constructed wall so that the exhaust gases pass at right angles to the incoming fuel, either gas or oil, which is thereby preheated. The gases are slowed down about 50 per cent in their travel, increasing the efficiency and economy of burning fuel. An additional feature is the fact that the pot becomes a part of the top framework of the furnace so that seepage of the bath into the brickwork is avoided around the top of the pot. For pots up to 24 in. diameter, one burner suffices, but this equipment can be built in any size and with more than one burner. This is a product of the *A. F. Holden Co.*, New Haven, Conn.

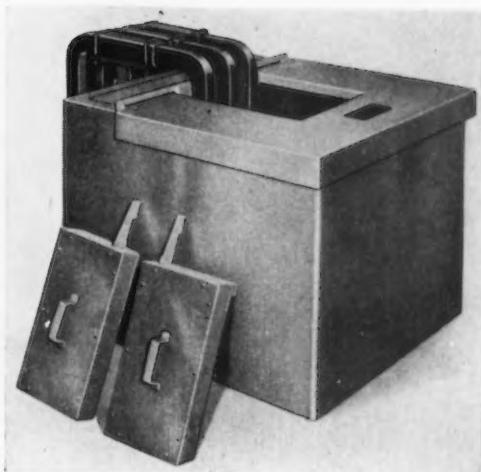


are designed for service up to 1200 deg. F. and are lined throughout with stainless steel. Two shelves are provided for holding the work, one at hearth level, the other in an intermediate position in the chamber. The heating elements are located in the bottom

of the chamber and are of the Cooley embedded type, well protected. The furnaces are arranged for three-phase, 230-volt service and have a capacity of 30 and 15 kw. respectively. In the larger furnace, the elements are arranged in two zones of control, each

LARGE nitrate bath for the heat treatment of aluminum alloys utilizing the Ajax-Hultgren heating principle in which heat is generated directly in the salt bath by virtue of its resistance to the flow of current between narrow electrode gaps. The electrodes are so arranged and proportioned as to produce an automatic circulation of the bath by means of electromagnetic forces generated at the electrodes, resulting in uniform temperatures throughout the bath and virtual elimination of maintenance expense since no heating element replacements are necessary. The furnace has a working temperature range from 450 to 1100 deg. F., covering the annealing and precipitation hardening of all aluminum alloys. The pot shown measures 84 in. long, 24 in. wide and 46 in. deep. It was built by the *Ajax Electric Co., Inc.*, Philadelphia.





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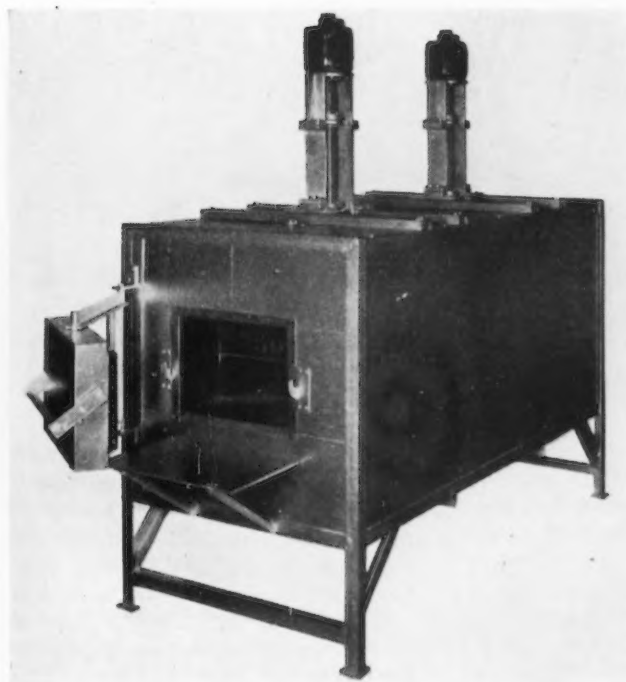
THREE phase electrode furnace with vertical individual adjustable electrodes up to 30 in. in length. Use of a cover plate which drains any bath salt back into the furnace permits loading from three sides. Hand-operated covers are used for overnight shutdowns or small individual loads, and a flexible cover is being developed that permits use while work is in progress. It will reduce heat input materially. This is another new product of the A. F. Holden Co.

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COREX immersion heater for oil tempering baths, announced by Westinghouse Electric & Mfg. Co., Mansfield, Ohio. The new unit is made of high quality steel tubing and has a low power density of approximately 11 watts per sq. in. of active tube surface. The heaters are available with an effective heating depth of 5 or 10 in., having respective ratings of 2000 and 4000 watts at 115 or 230 volts. Any of these models may be connected in series on 440 volts.

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ELECTRIC furnace built by the Cooley Electric Mfg. Corp. for the tempering and straightening of shafts. Double deck hearth is lined with stainless steel, and the air is circulated by two motor driven fans on top of the furnace chamber. The size shown is rated at 30 kw.

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zone being furnished with switches for reduced input operation.

Circulation of the chamber air is provided by nickel-chromium fans located at the top of the furnace chamber and driven by ½-hp. motors. The direction of air circulation is such that opening the door has little effect upon the chamber temperatures, so that shafts may be removed individually without disturbing the heating of the load.

Oil Immersion Heaters

TWO improved types of oil immersion heaters designed specifically for heating mineral oil, paraffin and alkaline cleaning solutions, are announced by *Westinghouse Electric & Mfg. Co.*, Mansfield, Ohio. The non-circulating heater is designed for tanks or oil baths requiring little or no circulation. The heating tubes range from 14 to 37 in. in length with a rating of from 1 to 3 kw. These units meet conditions where the heavy oils or minerals cannot be circulated at low temperatures and require a low watt density rating because they absorb heat slowly.

The circulating heater is designed for applications where the oil circulates at a sufficient rate by convection to absorb the heat and prevent excess heater tube temperatures. The heater tubes range from 32½ to 37 in. in length with a rating of from 5 to 8 kw. These tubes can be used for both oakite and alkaline cleaning solutions. Both the circulating and non-circulating types are designed with low watt density per square inch of heating surface, as excess heater tube temperatures cause carbon to form on the heater tubes.

Insulating Firebrick

THE *Babcock & Wilcox Co.*, 85 Liberty Street, New York, has recently introduced a new insulating firebrick, designated as K-16 and representing a radical improvement in heat insulating materials. This new product is said to have the stability of a fire-clay refractory, yet weighs less and has insulating values comparable with or superior to unfired insulating materials. Made of a special Georgia kaolin by a new process, K-16 is claimed to hold its structure, show negligible shrinkage, and can withstand loading without deformation at temperatures up to 1600 deg. F. for direct exposure and 2000 deg. F. (interface) for backing up. The average weight is only 1.1 lb. per 9 in. straight or approximately 19 lb. per cu. ft.

ECONOMY GRADES OF PRE-FINISHED METAL

OF interest is the recent development of a new series of B and C grade steel-base pre-finished metals by American Nickeloid Co., Peru, Ill.

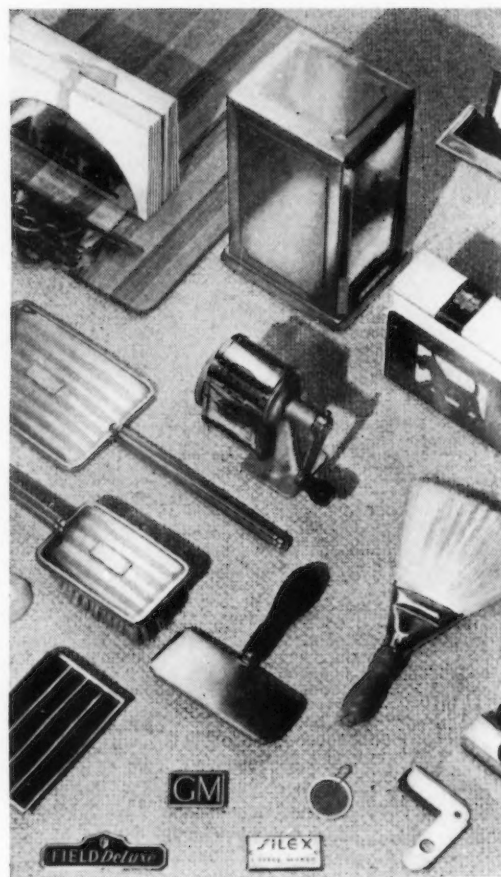
This, as the name implies, is an economy grade series of metals, although the heavy copper undercoating used for Grade A metals is retained.

The new series is available in sheets, flat strips or coils to meet a variety of modern production requirements. Stock sizes for sheets is 24 x 96 in., although these can be supplied in lengths up to 160 in. when desired. Flat strips are available in the same lengths and in widths of $\frac{1}{8}$ in. or wider. The new metals are also produced in coils for continuous feeding to automatic machines. And these coils are

furnished in widths from $\frac{1}{4}$ in. up to 24 in., in lengths sufficient to bring their weight to as high as 2000 lb.

The metals are produced in bright or satin finishes of nickel, chrome or copper, finishes on one or two sides, and in striped or crimped patterns. Variations are: Unpolished nickel or copper steel which is available when desired; or an unpolished nickel back or a lightly polished nickel back.

Since the new series was introduced it has found a wide market, and typical applications are shown in the accompanying illustration.



RUST-PROOFING IN COLORS

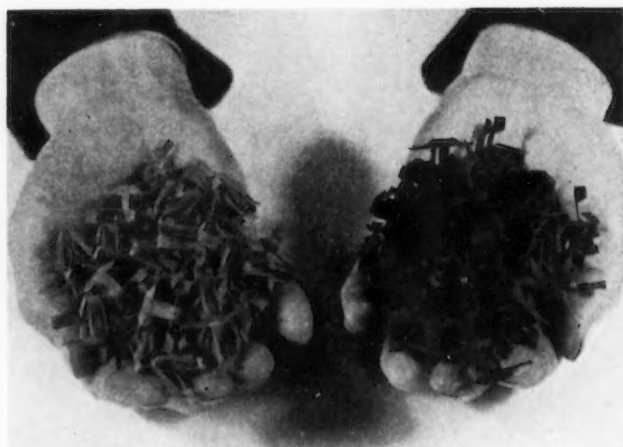
THE Commercial Avenue plant of the Rust Proofing & Metal Finishing Corp., Cambridge, Mass., is completing the first quantity production order of rust-proofing in colors of many thousands of pieces, totaling 8000 lb. of material. About 4000 lb. of these tiny parts have already been rust-proofed with a bluish-green finish. The other two tons of similar pieces are coming from the processing tanks with a dark red finish.

The main purpose for rust-proofing in the various colors is to save time in

assembling, save mistakes and help workers on an automobile assembly line to identify parts promptly. Also, increased sales appeal for certain articles is an objective.

The method used in the rust-proofing is classified as a "chemical immersion" process, but no technical details are available. The articles are

immersed in heated solutions while being tumbled in revolving perforated drums. As regards comparative costs with other conventional systems, it is estimated that the new coloring process requires 10 per cent more time from start to finish for the jet black finish and approximately 20 per cent more time for the other colors.



THE clips on the left are rust-proofed to a yellow finish and those on the right are colored dark red. The coloring prevents mixing of similar articles.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

	February 1940	January 1940	December 1939	January 1939	12 Months 1939	12 Months 1938
Steel Ingots: (net tons)						
Monthly output ^a	4,374,625	5,619,698	5,784,150	3,555,274	51,261,166	31,071,292
Average weekly output ^a	1,056,673	1,268,555	1,308,631	802,545	983,145	595,921
Per cent of capacity ^a	69.62	83.58	85.57	52.48	64.29	39.65
Pig Iron: (net tons)						
Monthly output ^b	3,311,480	4,032,022	4,220,536	2,436,474	35,317,374	18,782,236
Raw Materials: (gross tons)						
Coke output ^c (net tons)	4,172,042	4,945,368	5,031,797	3,444,256	44,425,123	32,495,800
Lake ore consumed ^d	4,241,839	5,289,308	5,538,374	2,926,706	44,361,289	25,703,050
Scrap iron and steel consumed ^e	3,054,000	3,775,000	3,805,000	2,495,038	35,006,000	21,528,000
Castings: (net tons)						
Malleable, orders ^f			45,978	38,105	489,482	289,384
Steel, orders ^f		43,121	64,143	42,972	685,074	333,278
Finished Steel: (net tons)						
Trackwork shipments ^a	6,898	6,762	6,768	2,909	69,250	37,336
Fabricated shape orders ^f	92,526	78,829	84,383	101,712	1,305,049	1,256,639
Fabricated plate orders ^f		33,804	23,627	20,511	357,393	285,061
U. S. Steel Corp. shipments ^g	1,009,256	1,145,592	1,443,969	870,866	11,707,251	7,315,506
Fabricated Products:						
Automobile production ^h	421,820	449,314	463,633	353,572	3,732,608	2,655,171
Steel furniture shipments ^g		\$2,263,633	\$2,159,729	\$1,782,791	\$22,609,168	\$20,355,973
Steel boiler orders ^g (sq. ft.)	557,957	525,443	553,796	1,130,612	11,098,316	4,199,442
Locomotives ordered ⁱ		28	127**	8	415	228
Freight cars ordered ⁱ		209	4,381**	3	56,915	16,539
Machine tool index ^j	92.9	93.3	93.3	52.5	70.0	*
Foundry equipment index ^k	179.4	197.9	164.8	122.3	196.5†	106.5†
Non-Ferrous Metals: (net tons, U. S. only)						
Lead shipments ^l		39,875	44,881	40,189	555,074	421,625
Lead stocks ^l		68,539	58,777	117,214		
Zinc shipments ^m	53,048	57,551	53,468	42,639	598,972	395,554
Zinc stocks ^m	67,086	65,602	65,995	128,407		
Tin deliveries ⁿ (gross tons)	6,600	9,780	11,366	4,330	71,896	50,660
Refined copper deliveries ^o	72,809	108,465	107,380†	54,827	948,559	607,672
Refined copper stocks ^o	145,393	135,441	159,485	301,244		
Exports: (gross tons)						
Total iron and steel ^p		583,521	600,437	362,672	6,076,429	5,148,006
All rolled and finished steel ^p		293,356	280,992	107,552	1,883,506	1,392,703
Semi-finished steel ^p		78,632	78,636	15,442	328,893	249,635
Scrap ^p		185,653	204,298	225,434	3,551,589	2,974,375
Imports: (gross tons)						
Total iron and steel ^p		8,274	14,709	27,664	315,161	264,550
Pig iron ^p		1,914	1,318	586	38,592	33,088
All rolled and finished steel ^p		2,285	3,346	18,680	156,707	155,535

†Three months' average. *Not available. ††Preliminary. **Includes yearly adjustments. ‡Five-months' average.

Source of data: ^aAmerican Iron and Steel Institute; ^bTHE IRON AGE; ^cBureau of Mines; ^dLake Superior Iron Ore Association; ^eBureau of the Census; ^fAmerican Institute of Steel Construction; ^gUnited States Steel Corp.; ^hPreliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; ⁱRailway Age; ^jFoundry Equipment Manufacturers Association; ^kAmerican Bureau of Metal Statistics; ^lAmerican Zinc Institute; ^mNew York Commodity Exchange; ⁿCopper Institute; ^oDepartment of Commerce; ^pInstitute of Scrap Iron and Steel.

THIS WEEK

ON THE

ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

... General Motors special tools and dies cost over \$38,000,000 for year's program, according to 1939 report ... Investment for production nearly half a billion dollars in last six years ... Machinery depreciation rate in GM plants is decreased; life expectancy upped two years ... Bonus plan explained in annual statement ... Output above 100,000 mark for fifth week ... Quarter brings 1940 model total to 2,500,000 vehicles.

DETROIT—An indication of the amounts expended in mass production industry to tool up for new models and to keep in the fore of technological improvements is given in the annual report of General Motors Corp., prepared for presentation at the annual meeting.

Year's Program Typical

The report shows that in the six years since the depression curve first nosed upward, capital investment applicable to plant accounts and to tools, dies, etc., has been made as follows:

	Six years ended Dec. 31, 1939	Year 1939
For plant construction, real estate and equip- ment	\$290,360,804	\$87,049,442
For special tools, dies, etc.	183,054,629	38,556,455
Total	\$473,415,433	\$75,605,897

That averages nearly \$79,000,000 a year.

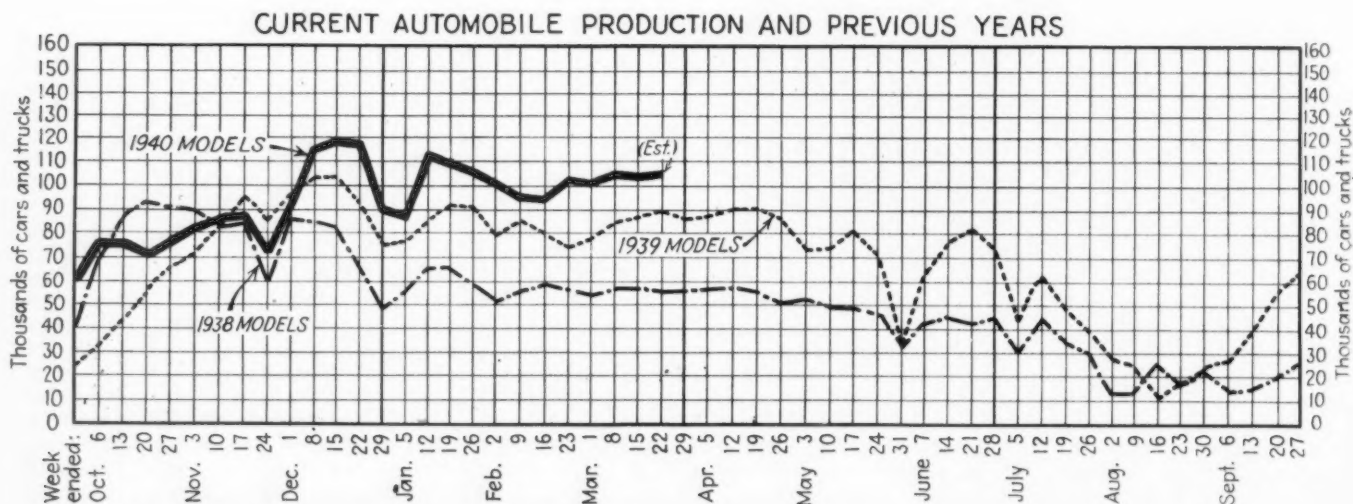
Last year's program is a typical one; major new projects were the increase in size and facilities of the Allison (airplane engine) division and the equipping of the new plant for the

Olds hydramatic transmission. Expenditures for tools, dies, etc., in 1939 applied principally to 1940 products, and these tools are written off as part of the cost of production of the models to which they apply. A departure is observed in the scale used for writing off other equipment, however. Major changes were:

1) Depreciation rate for buildings increased from 3 per cent to 3½ per cent.

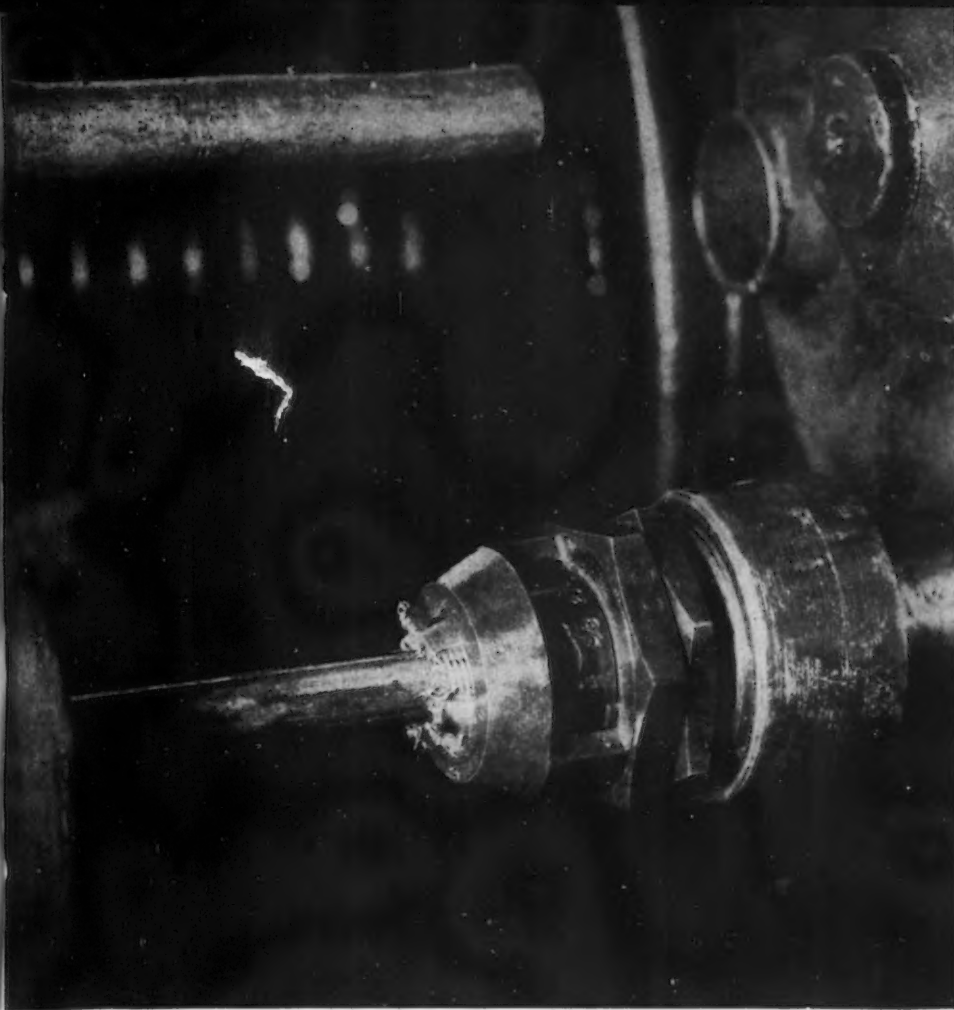
2) Depreciation rate for major portion of machinery and equipment reduced from 10 per cent a year to 8 1/3 per cent, partially offset by use of a higher rate on certain special facilities, the useful life of which is particularly affected by product changes and improvements.

The change in the machinery depreciation rate amounts virtually to a lengthening of the recognized potential life of such equipment from 10 years to 12 years. It is understood to apply mostly to standard lines of equipment or to the somewhat special machines which can be rebuilt or adapted from time to time as the product undergoes minor changes, but not



Source: Ward's Automotive Reports Trucks and Passenger Cars, U.S. and Canada

	P R O D U C T I O N C O M P A R I S O N S		
	Oct., Nov. and Dec.	Jan., Feb. and March	Total to date
1938 MODELS	1,032,201	753,470	1,785,671
1939 MODELS	1,014,799	1,086,350	2,101,149
1940 MODELS	1,162,990	1,327,260 (EST.)	2,490,250 (EST.)



Each "Acorn" Die before final approval threads an actual test plug which is shipped to you with the die.

AMAZING PERFORMANCE OF "ACORN" DIES NO "ACCIDENT"

**How precision manufacture and repeated tests
contribute to long accurate life**

Super-accurate tools, such as "Acorn" Dies, call for unusual care in design and manufacture. Variation in cutting angle, in clearance, in chamfer — the least unevenness where the Die seats in the holder, destroys accuracy and cuts production to a fraction of what it should be. G. T. D. Greenfield supplements manufacturing care by thoroughly testing completed die. Some of the methods used to insure top performance are shown here.

It isn't the occasional record of an individual die that matters — it's the steady, consistent high production that "Acorn" Dies produce that makes them so favored by production men.

Greenfield Tap & Die Corporation · Greenfield, Mass.

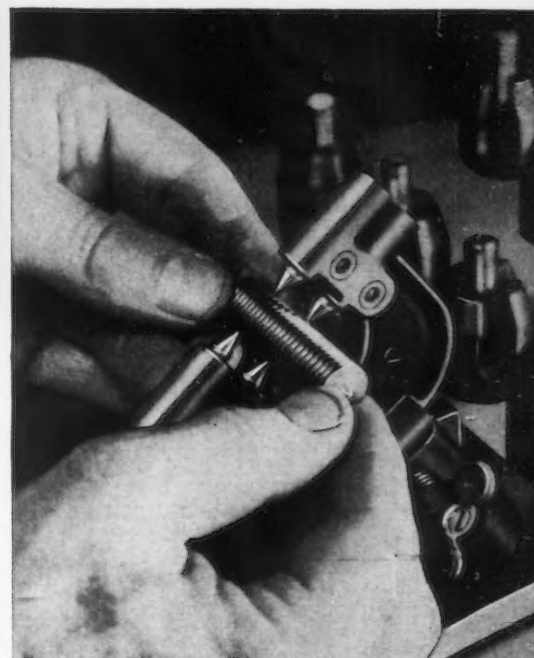
Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles and San Francisco
In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.



TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES · PIPE TOOLS

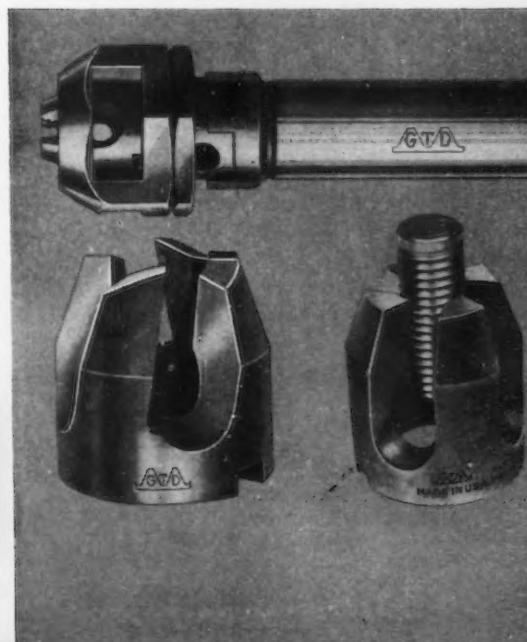


Too hard is as bad as too soft. Each heat-treated "Acorn" Die must pass this Rockwell Hardness Testing Machine.



Above: Limit snap thread gages check the pitch diameter of every "Acorn" Die test plug — 100% inspection.

Below: "Acorn" Die in regular holder.
Right: An "Acorn" Die with test plug inserted.
Left: An "Acorn" Hollow Mill.



to actual "special" single purpose machines that are not adaptable to any new jobs that might come up.

GM Executives Are "Partners"

Explained in the report is the oft-mentioned bonus plan in which GM executives have participated since 1918. Aimed largely at securing "owner interest" in executives, the bonus plan is an attempt to place executives "in the same relative position, in so far as is practicable, as if they were in business on their own account." The plan now provides that there may be set aside as a bonus fund 10 per cent of each year's net earnings, after deducting 7 per cent on the net capital employed during the year. This means that last year there had to be earned for the stockholders approximately \$79,327,000, equivalent to \$1.62 per share on common stock, before a bonus fund became available. The group eligible for bonus consideration includes all those who receive salaries at the rate of \$2,400 a year or more. Except for employees in foreign divisions who are paid in the currency of the country where they work, the payments are in stock.

Taxes more than double what they would have been under the 1929 tax

structure are reported under the heading "Cost of Government." The last year's total ascertainable direct tax bill was \$101,884,000, approximately \$57,500,000 higher than might have been levied under conditions just a decade ago.

Production Rate Steady

Half of the 1940 model year has passed, and the industry has chalked up a mark of 2,500,000 cars and trucks produced, compared with 2,076,607 units in the first six months of 1939 model production. The first three months of 1940 saw also a substantial gain over the last three months of 1939, the first quarter (estimated) production being 1,327,260 units, compared with 1,162,990 for last quarter.

A steady production rate in excess of 100,000 a week has been maintained since mid-February and probably will be the rule for some weeks to come. Last week, according to Ward's Automotive Reports, there was a moderate easing because of work stopped in Chrysler plants on Good Friday, but the total was 103,395 vehicles, compared with 105,720 in the previous week and only 89,400 in the corresponding week a year ago. Chrysler plants turned out 20,510 cars and

trucks during the week, compared with 25,210 a week earlier, while GM plants accounted for 45,990—up from 45,668. Ford turned out 23,100 vehicles of all types, compared with 21,425 in the previous week.

This is not only the season of high production, but also is the time when inventories (new cars in hands of dealers) reach the peak for the year. It is now that the question is asked, "What are they doing with all the cars?" And the answer is that they are being sold—quite rapidly, considering the season—or being stored for spring sale. Dealer stocks are currently estimated at half a million, or a little less, and this is not considered unusually high, although it is 75,000 or 100,000 higher than at the same time last year. However, sales volume is running 30-50 per cent above a year ago.

High inventories in anticipation of spring sales are necessary because the industry cannot produce cars at a rate commensurate with the sales rate—when John Public begins to buy and insist on immediate delivery. Excess of production over sales is at a peak in early fall, just before new cars are introduced, and again in January and February. For these two months this year the excess (cars moving into inventory) has been estimated at about 110,000 and 87,500, respectively. By now, sales are on the upgrade so sharply that they are nearly counterbalancing production (last March output was gaged only 2700 over sales) and sales in April will begin to eat into the inventories. There is no fear of inability to move the 500,000 cars from inventory (they amount to about 12 cars for each of the 42,000 dealers in the United States) and the real point of attack is in the used car lots. Untold numbers of used vehicles must be moved, but current reports indicate that the movement has already started successfully. Some dealer areas have been waging newspaper advertising campaigns for many weeks to do this. And it is generally accepted that as long as payrolls in industry remain high, these cars will be sold without trouble, for it is admitted payroll-born purchasing power keeps this market alive.

THE BULL OF THE WOODS

BY J. R. WILLIAMS

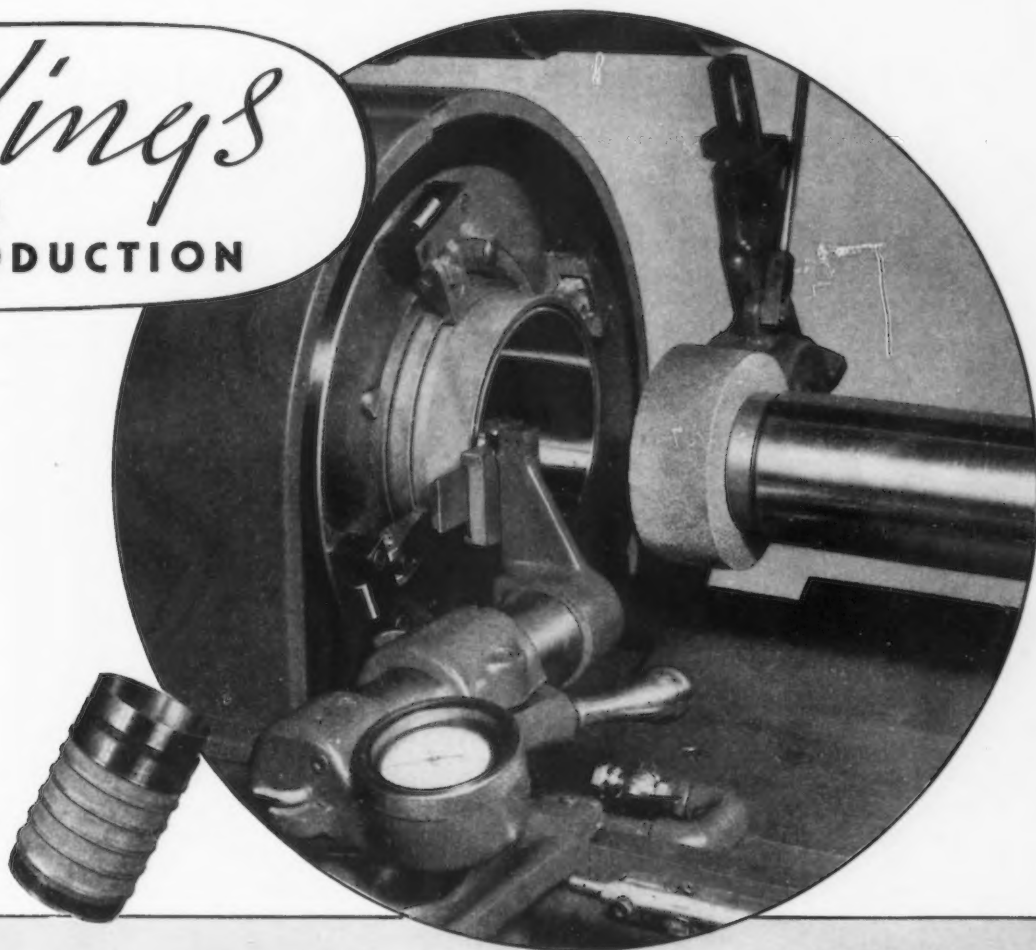


Republic Pays \$6

AT a meeting of the board of directors of Republic Steel Corp., March 19, a dividend of \$6 per share on the 6 per cent cumulative convertible preferred stock was declared, payable May 1, 1940, to stockholders of record April 12, 1940.

Wings

FOR PRODUCTION



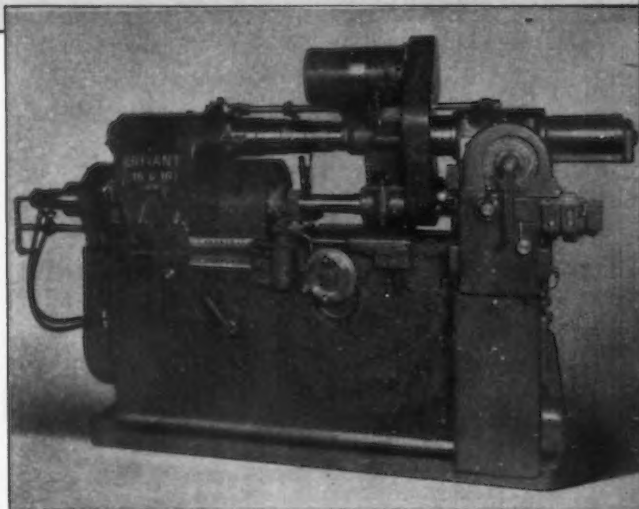
THE BRYANT 16-C-16 is being used by leading aircraft manufacturers throughout the world for speeding production and obtaining finer finish and greater accuracy on aircraft cylinder barrels. The Bryant principle of wheel suspension is a large contributing factor in producing cylinders rapidly, maintaining absolute roundness and straightness, and

a superior finish. The liquid cooled cylinder shown above, is produced in 20 minutes, floor to floor.

If you would like to add wings to your production of internally ground parts, write to Bryant — Bryant has an internal grinder for every production requirement.



BRYANT
CHUCKING GRINDER
COMPANY
Springfield, Vermont



THIS WEEK IN WASHINGTON

... Cut in educational orders urged because of war business ... Roosevelt reported weighing spend-lend drive before election ... Delay in scrap licensing bill sought by State Department.

By L. W. MOFFETT
The Iron Age

WASHINGTON—The controversy surrounding the question of supplying United States aircraft of the latest design to foreign governments prompted some members of Congress this week to urge curtailment of the Army's \$40,000,000 program for educating private industry in the manufacture of essential war supplies. Members of a Military Affairs Sub-committee of the House Appropriation Committee, in an effort to pare the Army's record \$868,013,743 appropriation, had before them a suggestion that the educational orders program might be curtailed on the ground that actual and expected war orders from foreign governments would train domestic manufacturers without expense to this country.

The pending appropriation measure if it follows the Army recommendation will provide \$16,250,000 for educational orders during the next fiscal year. This compares with \$14,250,000 made available during the current fiscal year. Congress already has authorized appropriations—to be distinguished from actually appropriating the funds—of \$40,000,000 for the completed program.

Program Began Last April

The program, designed to familiarize manufacturers with the production of certain non-commercial products including gas masks, fuses and small arms, has been under way since April, 1939, at which time the first awards, totaling close to \$2,000,000, were made to six companies. Although Congress appropriated the \$14,250,000 figure for use after July, 1939, the War Department made no further awards until early this year. Since then substantial orders have been placed and announced at infrequent intervals.

The difficulty of depending upon

foreign orders to educate manufacturers in this country, according to adherents of unrestricted program in Congress, is that for the most part foreign purchases have thus far been limited to aircraft and powder, items which are not involved to any great degree in the current educational order program. Members of Congress who opposed the move to trim expenditures via educational orders called the proposal "shortsighted," pointing out that such a curtailment would adversely affect vital war industries which are not benefiting by orders from abroad.

More Details Published

In awarding educational orders the War Department has altered the policy which prevailed last year by giving more complete details in making awards public. Formerly, the practice was to list the manufacturer receiving the order without naming the total value of the contract. This year, however, no effort is made to withhold the amount of money involved in each order.

On the subject of releasing latest model aircraft for sale abroad, President Roosevelt vigorously defended the Administration's policy last week, pointing out that he believed the practice was serving the best ends of national defense by encouraging expansion of domestic plant facilities.

Also reflecting the Administration's view on the matter was a letter written by Secretary of the Navy Charles Edison to Representative Carl Vinson, chairman of the House Naval Affairs Committee. Mr. Edison denied that the cost of aircraft to the Navy has been enhanced, or the Navy's program interfered with, by sales abroad, insisting that on the contrary the cost has been reduced. The Secretary of

the Navy cited one instance in which he said there had been a \$575,000 reduction in cost to the Navy due to the manufacturer's reduction of the overhead ratio on account of his greatly enhanced volume of business due to export orders.

Thousands Are Trained

"The enlarged volume of aircraft manufacture for export is of inestimable value to our country economically and from the standpoint of national defense," Mr. Edison wrote. "Upon it is based, directly and indirectly, the employment of working forces enlarged by many thousands. These additional employees are, in a short period, trained in a useful trade, with benefit to themselves and the Nation throughout their industrial lives.

"Administrative, engineering, and supervisory forces are not only enlarged but are trained and experienced in the organization and control of their industry operating on a large scale not otherwise attainable. The enlarged volume of business furnishes the means and the incentive upon which the industry can base a more extensive development program. Enlarged plant facilities will assure the execution of any future program for our own country. The inefficiencies to be anticipated are minor and fleeting, the benefits may be expected to endure for at least a generation."

The House Military Affairs Committee ordered the subject investigated last week after a controversy flared between the War Department and an unofficial coordinating committee headed by Secretary of the Treasury Morgenthau. While the House investigation was tentatively delayed, a resolution was referred to the Senate Military Affairs Committee, calling for a thorough investigation into charges that sales abroad were interfering with the War and Navy Department's armament program.

ICC Member Resigns

WASHINGTON — Marion M. Caskie has resigned, effective April 1, as a member of the Interstate Commerce Commission to become vice-president of the Reynolds Metals Co., Richmond, Va., manufacturer of tin foil, with which he was associated in 1930-31 as assistant to the vice-president.

OPERATOR INTEREST

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Operation—Rough Turning
Machine — Monarch 20"
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Cutting Speed—
70 S.F.P.M.
Depth of Cut— $\frac{1}{8}$ "
Feed per revolution—0.25"
Cutting Lubricant—1 part
Sunoco to 10 parts water

Photo Courtesy of
MONARCH MACHINE TOOL CO.



PETROLEUM PRODUCTS FOR ALL INDUSTRIES

Delay in Scrap Licensing Bill Sought by State Department

WASHINGTON—The State Department's assertion that no question of foreign policy would be involved if Congress desired to restrict the exportation of scrap steel in the interest of national defense, made before the House Military Affairs Committee on Feb. 13, apparently was a bit premature, according to information disclosed by a member of the House Military Affairs Committee this week. THE IRON AGE was told that at the request of the White House and the State Department, the committee has agreed to delay consideration of a scrap licensing bill proposed by Representative J. Joseph Smith until the department can ascertain whether such a law would be a violation of existing treaty obligations.

A more complete investigation of the ramifications of the Smith measure was understood to have been ordered after other bills pending in Congress, one of which concerns the employment of United States citizens on construction projects in the Panama Canal Zone, were criticized as being in direct violation of existing treaties to which the United States was a signatory. While the chances for the Smith bill were already regarded as slim, the latest development is expected to be a greater setback. The move was interpreted in some quarters as indicating that the Administration was apprehensive that an embargo bill might progress further in Congress than was generally realized.

Attitude Changed

The State Department's announcement in February that foreign policy was not a factor did not appear to enhance the chances for the Smith bill, but it did represent a change from the department's attitude two years ago when similar legislation was pending in Congress. At that time it was generally understood that Secretary of State Hull opposed any move to restrict exports on the ground that it was contrary to the Administration's reciprocal trade policies.

At the February hearing before the House Military Affairs Committee a State Department spokesman went out of his way to avoid expressions of opposition against the Smith measure. In effect the State Department reported that if national defense was involved in restricting scrap exports, foreign policy was not a consideration.

The War Department then followed with the statement that the national defense angle was not important so long as there was no scrap shortage. The Bureau of Mines in effect reported: "No shortage." Added up, this meant to most observers: "no law."

The House Military Affairs Committee has recently received a report on the Smith bill from the War Department but it has declined to make the report public. The report, however, was expected to follow very closely along the lines of testimony

Roosevelt Reported Weighing Pre-Election Spending Drive

WASHINGTON—President Roosevelt was represented this week as closely watching all business indicators for the months ahead before deciding to throw full Administration support behind pending bills to launch a new pre-election spendend program. Congressional adherents of a revitalized works program apparently are waiting only for word from the White House before instigating their new offensive.

Added to the measures proposed by Senators Robert F. Wagner and James M. Mead, both Democrats of New York (see THE IRON AGE, March 21, 1940, p. 60), is a broader bill introduced by Senator Charles O. Andrews, Democrat of Florida. A 1940 version of the Administration's spendend program for self-liquidating projects, the Andrews' pump-priming formula could provide a billion dollars without affecting the debt limit by establishing a \$300,000,000 revolving fund for making long-term loans for the construction of new public works.

Interest Fixed by Commissioner

Although interest rates are not specified in the measure, these would be fixed at a rate to be determined by a commissioner of public works. Since Congressional sponsors claim the rates would only have to pay the interest on Government-guaranteed bonds plus a small percentage to cover expected defaults, the interest rates are looked to to attract municipalities despite the lack of Federal grants.

Some indication of the temper of

given the committee by Col. Harry T. Rutherford, director of the War Department's Planning Branch. His testimony was that an embargo on scrap was unnecessary in the interest of national defense.

It was reported that the House Committee, headed by Representative Andrew J. May, Democrat of Kentucky, has taken up the Smith measure once since the hearings in February, but immediately dropped consideration of the measure at the request of President Roosevelt and Secretary Hull. Even if the way is subsequently cleared for further consideration of the measure, a majority of the members are expected to vote in opposition to the bill.

Congress on the subject of reviving the PWA program was given last week in the House when members applauded the remarks of Representative William T. Schulte, Democrat of Indiana, who is jointly sponsoring with Senator Mead a modified program to breathe new life into the Federal works agency.

Waving in his hand a copy of a request for PWA revival signed by labor constituents in Indiana, the Congressman referred to the PWA program as "the greatest construction program in the world's history," and reminded his colleagues that "banks are not making any loans on new construction, and, of course, the building-trades men suffer."

"At Little Cost"

"I now appeal to the members of this body to kindly join in using your influence to help bring the Schulte-Mead bill out on the floor and have it passed this session of Congress," the Congressman said. "This will mean giving employment to over 1,000,000 building tradesmen throughout the United States, at but very little cost to your government."

There are indications, however, that if it is ascertained by the President that business definitely needs a pre-election shot in the arm, the more comprehensive program embodied in the Andrews measure will receive Administration blessing. Failing that, the New Deal would be satisfied to fall back on a composite program combining the features of the Wagner and Mead bills.

TRADE **AUTOMATIC** MARK USERS ARE SAVING THOUSANDS OF DOLLARS WITH IMPROVED MATERIALS HANDLING . . .

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Interplant Shipping

"Unit-load system adopted by refrigerator plant has reduced total materials approximately one-fourth. Vendors also profit."

Modernization

Even in an old building there is slight excuse for an outdated materials handling. This plant profited well.

Problem: Build or Revise Handling Method

These manufacturers had been renting a warehouse adjacent to their factory; owner sold it "out from under them." Building was impractical due to the age of the truck and the heavy loads.

Union Bag Uses

ELECTRIC TRUCKS

Interplant Shipping

NEW UNIT OF HANDLING EQUIPMENT SAVED COST OF NEW BUILDING

... of article featuring unit- shows how vendor-to-plant and equal opportunity for savings in handling costs.

How General Electric Handles Cable

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Tough to Move? Fork Trucks Are Our Answer

MATERIALS HANDLING . . . A Function of Traffic

10 Ideas for Anybody's Handling

It would be next to impossible for a factory man to walk through this plant and not pick up a bright idea or two on how to handle. Here's your chance for a tour by proxy.

*SPECIAL BULLETIN

Compiled for your reference from articles on "AUTOMATIC" Fork Truck Systems which appeared in leading trade publications during 1939.

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Many industries have re-organized their materials handling from haphazard uncontrolled methods to a scientific profitable basis with "AUTOMATIC" Fork Truck Systems. These installations have made possible such following factors so vital to the success of modern business.

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Center-Control Fork Trucks
Telescopic and Non-Telescopic Models
Capacities 4,000 to 10,000 lbs.

Non-Telescopic Models only, capacities 4,000 to 18,000 lbs.



WHEN YOU BUY TRUCKS..... Buy "AUTOMATIC"

Government Orders

WASHINGTON — Government awards under the Walsh-Healey act for iron and steel products for the week ended March 16, as reported to the Division of Public Contracts, Department of Labor, aggregated \$1,422,544. For the same period contracts for non-ferrous metals and alloys were \$76,521, while awards for machinery totaled \$207,031. Details follow:

Iron and Steel Products
 Republic Steel Co., Massillon, Ohio,
 Boston Navy Yard, steel 19,797

National Electric Products Corp.,
 Pittsburgh, Interior Reclamation,
 pipe and bends \$105,127
 United States Steel Export Co., Wash-
 ington, D. C., Panama Canal, struc-
 tural steel 26,222
 United States Steel Export Co., Wash-
 ington, D. C., Panama Canal, rein-
 forcement bars 21,860
 United States Pipe and Foundry Co.,
 Chicago, WPA, cast iron pipe 12,658
 The Ohio Seamless Tube Co., Shelby,
 Ohio, War Air Corps, steel tubing .. 52,040
 Sharpsville Steel Fabricators, Inc.,
 Sharpsville, Pa., War Air Corps,
 cylindrical tanks 84,700
 Lukenweld, Inc., Coatesville, Pa., War
 Ordnance, base rings 39,504
 Stupp Bros. Bridge & Iron Co., St.
 Louis, Interior Reclamation, trash-
 racks 110,990
 The Chas. Fischer Spring Co., Brook-
 lyn, War Ordnance, rifle parts 103,119

Service Tool & Engineering Co., Day-
 ton, Ohio, War Air Corps, screw
 drivers, etc. 18,968
 The Bunell Machine & Tool Co.,
 Cleveland, War Air Corps, puller
 assembly, etc. 14,634
 The Steel Products Engineering Co.,
 Springfield, Ohio, War Air Corps,
 special tools 11,944
 Service Machine Co., Inc., Elizabeth,
 N. J., War Ordnance, machine gun
 parts 39,648
 Bethlehem Steel Co., Bethlehem, Pa.,
 Navy Secy's Office, gun forgings .. 378,425
 The Babcock & Wilcox Tube Co.,
 Beaver Falls, Pa., Navy S & A,
 boiler tubes 11,701
 The M. K. Epstein Co., Springfield,
 Mass., Navy S & A, car bottom
 furnace 14,300
 Gary Steel Products Corp., Norfolk,
 Va., Navy S & A, steel barrels ... 20,839
 Baldr Anchor Chain & Forge Corp.,
 Chester, Pa., Navy S & A, anchor
 chain 172,500
 Lakeside Bridge & Steel Co., Milwau-
 kee, TVA, lock gates 84,423
 The Pfaudler Co., Rochester, N. Y.,
 War CWS, jacketed reactor units .. 23,940

Non-Ferrous Metals and Alloys

I. Stern & Co., Inc., New York City,
 Navy Purchasing Office, gold cast-
 ing \$16,500
 Revere Copper & Brass, Inc., Balti-
 more Division, Baltimore, War Ord-
 nance, bullet cups 10,500
 The Aluminum Goods Mfg. Co., Mani-
 towoc, Wis., War CCC, food con-
 tainer inserts 13,224

Other Machinery

American Laundry Machinery Co.,
 Cincinnati, TVA, freezing unit ... \$23,659
 Pratt & Whitney Division, Niles-
 Bement-Pond Co., West Hartford,
 Conn., War Ordnance, engine lathes .. 21,175
 Caterpillar Tractor Co., Peoria, Ill.,
 War QMC, tractors, motor graders .. 38,297
 Bay City Shovels, Inc., Bay City,
 Mich., War QMC, shovels 28,800
 Ransome Concrete Machinery Co.,
 Dunellen, N. J., War QMC, pavers .. 14,650
 Pratt & Whitney Division, Niles-
 Bement-Pond Co., Hartford, Navy S
 & A, profile machine 13,950
 Sidney Machine Tool Co., Sidney,
 Ohio, Navy S & A, lathes 19,680
 Pacific Marine Supply Co., Seattle,
 Navy S & A, portable pumps 20,274
 Pangborn Corp., Hagerstown, Md.,
 Navy S & A, blast cleaning rooms .. 26,546



Cleveland Tramrail hand-propelled cranes with motor-driven hoists are provided in each bay of this machine shop. This equipment available for loads up to five tons.

ELIMINATE IDLE WAITING TIME *with* CLEVELAND TRAMRAIL

In many machine shops larger losses are incurred because both workers and machines are idle much of the time due to lack of proper materials handling equipment.

With a Cleveland Tramrail System there is no waiting. Material can be picked up and placed whenever the operator so desires. Further it can be moved between any two points in a plant without in-between handling.

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CLEVELAND TRAMRAIL
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 Other products: CLEVELAND CRANES and STEELWELD MACHINERY

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts last week awarded contracts to the following companies:

Lloyd & Arms, Inc., Philadelphia, hon-
 ing machine, \$8,260; Cincinnati Milling
 & Cincinnati Grinders, Inc., milling ma-
 chines, \$25,684; Russell, Burdall & Ward
 Bolt & Nut Co., Port Chester, N. Y., bolts
 and nuts, \$20,078; Micro-Westco, Inc.,
 Bettendorf, Iowa, internal grinder, \$21,-
 150; Standard Electrical Tool Co., Cin-
 cinnati, buffing and polishing machines,
 \$6,674; Pittsburgh Screw & Bolt Corp.,
 Pittsburgh, bolts and nuts, \$13,717; Re-
 public Steel Corp., bolt and nut division,
 bolts and nuts, \$9,889.

Northern Pump Co., Minneapolis, rotary
 fuel pumps for diesel and lubricating oils,
 \$202,177; Allis-Chalmers Mfg. Co., Mil-
 waukee, generator, \$6,000; Circle Wire &
 Cable Corp., Long Island, N. Y., wire,
 \$12,228; Yates American Machine Co.,
 Beloit, Wis., electric moulder, \$5,966; M.
 K. Epstein Co., Springfield, Mass., car
 type furnaces, \$22,632; Electric Products
 Co., Cleveland, arc welding machines,
 \$7,824; McKay Co., York, Pa., chains and
 rings, \$15,036; Caterpillar Tractor Co.,
 marine diesel engines, \$19,200; Cincin-
 nati Shaper Co., Cincinnati, squaring
 shear, \$5,821; American Brass Co., Wa-
 terbury, Conn., copper-nickel alloy tub-
 ing, \$8,248; Revere Copper & Brass, Inc.,
 Baltimore, copper-nickel alloy tubing,
 \$5,895; Henry Prentiss & Co., Inc., New
 York, milling and boring machine, \$130,-
 887; Pratt & Whitney Division, Niles-
 Bement-Pond Co., Hartford, toolmakers
 precision lathes, \$13,956; Ajax Electro-
 thermic Corp., Trenton, N. J., melting
 furnace, \$29,250; General Electric Co.

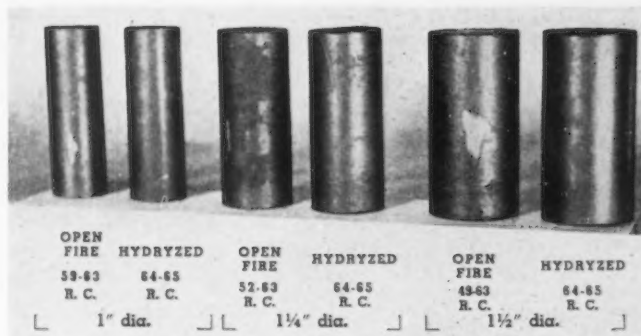


HYDRYZING eliminates "soft-spot" troubles due to scale

● If your carburized parts show erratic hardnesses on reheating and oil quenching chances are that much of the trouble is due to scale adhering to them and preventing the quench from "taking hold." Scale forms an insulating blanket and because oil will not "throw" the scale as does a water quench, spotty hardening very often results.

To insure maximum and uniform hardness, the parts should be protected against scaling and decarburizing, and the Hydrying process does just that. Scale cannot form regardless of how long the work may be in the furnace, and as a result it goes into the quench tank *clean*, quenches rapidly and uniformly so that soft spots due to scale are completely eliminated. And, of course, eliminating scale gets rid of pitting, so that grinding tolerances can be reduced many thousandths. And because the Hydrying atmosphere does not rob the surface of carbon, your parts are fully and uniformly hard right to the surface.

In addition to turning out work free from scale, decarb, or carburization, Hydrying is ideally simple. Thus, thoroughly dependable results are assured because the atmosphere is right for all steels, and no experimentation is required. It's easy to prove to yourself the many advantages of Hydrying. Just send us samples of your work. We'll Hydryze and return them to you immediately for inspection.



Pictured above are results of tests in which 1315X rounds, 1", 1 1/4", and 1 1/2" dia. x 3" long were carburized and one of each size hardened from the open fire, and one of each from the Hydryzer. All parts were in the 1500° hardening heat for the same length of time, and all were oil quenched in the same manner. In checking hardnesses on the open fire hardened parts scale was polished off so it would not affect hardness readings. Hardness readings for Hydryzed parts were made directly on the surfaces with no polishing. As is evident, the oil quenched hydryzed parts are uniformly hard because they quenched rapidly and uniformly. With open fire hardening the heat treater must often resort to water quenching with its attendant distortion problems.

HYDRYZING FOR HARDENING

LINDBERG ENGINEERING CO.

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CYCLONE FOR TEMPERING

Schenectady, N. Y., arc welding machines, \$39,500; Automatic Transportation Co., Division, Yale & Towne Mfg. Co., Chicago, crane truck, \$6,013.

Ross Galvanizing Works, Inc., Brooklyn, N. Y., steel plates, \$23,401; Mine Safety Appliance Co., Pittsburgh, closing valves for oxygen cylinders, \$8,250; National Supply Co., Superior Engine Division, Philadelphia, marine diesel engines, \$122,592; C. H. Wheeler Mfg. Co., Philadelphia, air ejectors, spare parts, \$46,280.

WASHINGTON—The War Department during the two-week period ended March 15 awarded contracts to these companies:

Bethlehem Steel Co., Bethlehem, Pa., steel forgings, \$284,362; Norris Stamping & Mfg. Co., Los Angeles, cartridge cases, \$502,000; Lansdowne Steel & Iron Co., Morton, Pa., steel forgings, \$57,000; Crucible Steel Co. of America, New York, steel forgings, \$80,868; General Time Instrument Corp., Westclox Division, La Salle, Ill., mechanical time fuse components, \$21,760.

For ammunition parts—R. L. Rettew & Co., Lebanon, Pa., \$14,147; Western Automatic Machine Screw Co., Elyria, Ohio, \$10,474; The National Acme Co., Cleveland, \$1,580; Wright Machine Co., Worcester, Mass., \$3,837; Chase Brass & Copper Co., Inc., Waterbury, Conn., \$2,775; Scovill Mfg. Co., Waterbury, Conn., \$82,244.

Doehler Die Casting Co., Pottstown, Pa., mechanical time fuse components, \$24,150; York Safe & Lock Co., York, Pa., ammunition, \$1,731,240; Bendix Aviation Corp., Eclipse Machine Division, Elmira Heights, N. Y., adapters, \$23,800; Bohn Aluminum & Brass Corp., Detroit, ground bodies, \$14,446; Bendix Aviation Corp., Marine Division, Brooklyn, synchronous assembly repeaters, \$1,240; American Steel Foundries, Chicago, material for light tanks, \$7,060; Bausch & Lomb Optical Co., Rochester, N. Y., spare parts and telescopic sights, \$101,015, adjusting lathes, \$1,785.

Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., geared head engine lathes, \$21,175; Production Tool & Die Co., Springfield, Mass., machine with dies, \$5,130; Lodge & Shipley Machine Tool Co., Cincinnati, geared tool room engine lathes, \$13,446; H. A. Smith Machinery Co., Syracuse, N. Y., drilling and centering machine, \$1,961; Edge Moor (Del.) Iron Works, Inc., jacketed mixers or preheaters, \$1,394; Rivett Lathe & Grinder, Inc., Brighton, Mass., bench lathe with attachments, \$2,240; Ball & Jewell, Brooklyn, N. Y., rotary cutter, \$2,398.

DeLisser Machine & Tool Corp., gages, \$1,606; Troy Tool & Die Co., Detroit, gages, \$1,829; Barker Tool Die & Gage Co., Detroit, \$1,010; E. A. Kinsey Co., Cincinnati, universal horizontal shapers, \$55,976; Bausch & Lomb Optical Co., Rochester, N. Y., aerial navigation instruments, \$112,350; Westinghouse Electric & Mfg. Co., Dayton, Ohio, power and control equipment, \$996,913; Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., starter assemblies, switches, \$32,029; United Aircraft Corp., Hamilton Standard Propellers Division, East Hartford, Conn., propeller and control assemblies, \$60,156; Kalamazoo (Mich.) Railway Supply Co., cars, rail and gasoline engine, \$6,385.

Inland to Refund Bonds

CHICAGO—The Inland Steel Co. has filed with the SEC a registration statement covering \$36,000,000 of first mortgage 3 per cent bonds, series F, due April 1, 1961. Proceeds will be used toward the redemption of \$35,000,000 of outstanding series D 3¾ per cent bonds at 105 per cent, which will require \$36,750,000.

ICC Members Condemn Car Ordering Abuses

WASHINGTON—A three-man committee of the Interstate Commerce Commission has made a report, which has been transmitted to A. F. Cleveland, president, Association of American Railroads, by Commissioner C. B. Aitchison, recommending means to do away with "abuses" in the ordering and supplying of freight cars. The committee proposed, among other things, revision of rule 34 of the consolidated freight classification to abolish the practice by shippers of ordering cars of a kind not actually needed and being furnished other types so as to get lower rates under the minimum loading capacity requirements.

The committee recommended that the rule be amended to provide that the minimum in every case shall be that for the car accepted and used regardless of what may have been ordered and that where two cars are furnished each will be treated as a separate unit in assessing freight charges. It was also recommended that the minimum weights under the rule be accurately graduated according to the cubical capacity of the car in lieu of the present graduations according to length.

In his letter to Mr. Cleveland, Commissioner Aitchison pointed out that the report reflects the views of three members of the committee and that the commission is in no sense committed to it.

Three Abuses

The 40-page report deals with three classes of so-called abuses. One relates to heavy bulk freight, another to double deck cars, and the third to minimum weight for light and bulky freight. In shipping bulky freight for which the minimum weight is the marked capacity or a percentage of the marked capacity of the car, the report said, there is a practice when small shipments are to be made of ordering cars of less capacity than in general service, not with the expectation of obtaining cars of the capacity ordered, but merely to obtain transpor-

tation subject to a reduced minimum weight.

Respecting double deck cars, the report stated, in part, that there is a practice of "ordering" these cars with the expectation of receiving and using twice the number of single-deck cars, thus defeating both the rate and the minimum weight. Discussing the third class, the report said that minimum weights for light and bulky freight are usually graduated according to the length of the car ordered by the shipper, "and there is a practice of 'ordering' short cars, when longer cars are wanted or of 'ordering' a single long car when two shorter cars are wanted, the purpose of these 'orders' being to avoid observance of the minimum weight for the car or cars actually desired and used."

The report was prepared by Burt L. Smelker of the Bureau of Inquiry; C. G. Jensen of the Bureau of Traffic and C. C. Wall of the Bureau of Service.

U. S. Blast Furnace Capacity Down in '39

CAPACITY of the iron and steel industry for producing pig iron and ferroalloys declined during 1939, according to the American Iron and Steel Institute. At the close of last year the nation's blast furnaces had a rated capacity of 55,723,640 net tons of pig iron and ferroalloys per year. This compares with 56,325,830 net tons annual capacity as of Dec. 31, 1938.

Largely because of the increasing use of steel scrap as a raw material for steel-making, the blast furnace capacity of the industry has declined slowly but steadily since 1930. At the close of that year total annual blast furnace capacity was 58,979,060 net tons of pig iron and ferroalloys, and in all but two of the succeeding years the total blast furnace capacity has declined.

The following table compares annual capacity for producing coke and charcoal pig iron and also ferroalloys as of the end of 1938 and 1939.

ANNUAL BLAST FURNACE CAPACITY

As of	(Net Tons)		Charcoal Pig Iron	Total
	Coke			
	Pig Iron	Ferroalloys		
Dec. 31, 1938	55,162,374	1,060,416	103,040	56,325,830
Dec. 31, 1939	54,635,740	992,320	95,580	55,723,640



DEVELOPED **OVER NIGHT**

**THIS
SPECIAL
OIL PAN
PUT US TO THE TEST!**

RECENTLY, one of the large truck manufacturers—themselves facing a definite delivery date—came to us with an oil pan problem that must be solved NOT IN A MATTER OF DAYS BUT IN A MATTER OF HOURS.

The problem, simply put, was the necessity of securing greater oil capacity within the definite limitations of the truck's construction, elements which could not be changed. Purely a matter of design.

Our engineers went to work—and within a matter of hours—practically over night—developed this oil pan that not only does the job demanded but can be stamped and welded economically.

Proving that we really mean it when we say we are designers of INTRICATE and makers of ECONOMICAL deep drawn stampings.

For those manufacturers having their own press equipment, Transue will gladly quote on die requirements!



TRANSUE & WILLIAMS

—ALLIANCE · OHIO—

DESIGNERS AND MAKERS OF DEEP DRAWN STAMPINGS

SALES OFFICES: NEW YORK · PHILADELPHIA · CHICAGO · DETROIT · INDIANAPOLIS · CLEVELAND

AIR
COMPRESSORS

Compact
Efficient
Reliable
Durable

Here is one of the
many types and sizes



Type "Y"
Compressor

Two-cylinder, two-stage, air-cooled, for continuous operation against 200 lbs. pressure, sizes 3.6 to 41 cu. ft. Controlled combined pressure and splash lubrication. Unloader system to prevent delivery of air when oil supply is depleted. Low power cost. Motors for any commercial circuit. Mounted complete on tank as shown, or on bed plate for sill installation. Catalog 2051. Write for prices.

Westinghouse
AIR BRAKE CO.
Industrial Division
PITTSBURGH, PA.

Industry's Responsibilities Are Acknowledged, H. W. Prentis Says

PITTSBURGH—Industry is in a position to take great strides toward economic recovery if there is an end to further experiment, confusion, and uncertainty, H. W. Prentis, Jr., president, Armstrong Cork Co. and president, National Association of Manufacturers, told more than 500 industrial leaders here recently.

"Industrial leaders recognize that industrial management must steadily improve production methods, must foster research, must encourage suggestions from every source, and pass along the fruits of such effort in the form of higher wages and reduced prices," Mr. Prentis said. "It must avoid unfair methods of competition and eradicate unethical practices. It must constantly seek to justify the freedom of private enterprise, by producing a higher standard of living with a wide diffusion of the comforts of life, by cooperating in the erection of reasonable safeguards against the hazards of human existence, by protecting and enlarging the opportunity for self-expression of its workers, and by making good use of its freedom to insure the whole structure of personal liberty against impairment."

When Umpire Also Plays

Mr. Prentis pointed out that "the increasing complexity of our modern life requires more umpiring on the part of public authority than was needed a hundred years ago. But when government ceases to be merely an umpire and with the full strength of its dominating authority steps into the game itself, many a player concludes that his chances to win are so greatly diminished, that a seat on the side-lines is preferable."

William P. Witherow, president, Blaw-Knox Co., in introducing Mr. Prentis, said: "Today, at least, it is obvious that long accepted truths and principles must be championed if they are to endure. Liberty, leadership and law—these three fundamentals of Mr. Prentis's address must be sold."

A detailed discussion of the National Manufacturers Association activities accompanied by slides was presented by Walter B. Weisenberger, executive vice-president of the N.A.M. The dinner session was preceded by an afternoon gathering of industrialists which covered national defense and industrial mobilization as well as the exchange of view points among those attending.

M. S. Rukeyser, economic news

commentator, predicted a simplified form of corporation accounting which has been adopted by many concerns will have a more beneficial effect upon popular understanding than the complicated systems now prescribed by Federal agencies.

Participating in a discussion on labor relations were O. W. Buenting, vice-president, Westinghouse Air Brake Co., E. F. Blank, director of personal relations, Jones & Laughlin Steel Corp., H. A. Houston, manager of production department, United Engineering & Foundry Co., and Noel Sargent and John C. Gall, officers of the N.A.M.

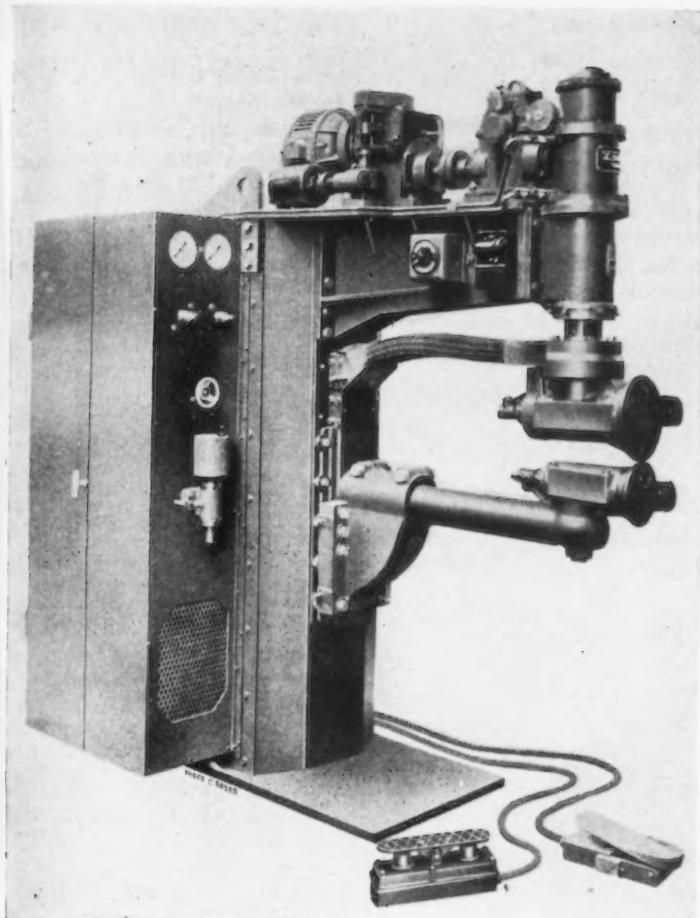
Ohio State Offers 3-Day Welding Engineering Course

A YEAR ago Ohio State University, Columbus, established a four-year curriculum in welding engineering. The course draws together the basic sciences necessary in the training of an engineer of service involving the use of welding.

For practicing engineers who need basic training for welding engineering, the welding division of the industrial engineering department of the university is offering a special short course, scheduled for April 16, 17 and 18. Three classes will be held daily on such subjects as welded joints, fundamental mechanics, welding symbols, and production welding. Several classes will be devoted to welded joints, covering the subject progressively. The course will replace the university's annual welding conference, held each year since 1931. Details are obtainable from J. R. Stitt, assistant professor, welding engineering, Ohio State University.

G-M Added 29,929 Men in '39

GENERAL MOTORS CORP. increased its payrolls for hourly wage workers in the United States in 1939 by \$74,949,002, or 39.7 per cent, over 1938, to a total of \$263,848,703, Alfred P. Sloan, Jr., chairman, said in his annual report to the more than 386,000 stockholders. He said the average number of the corporation's hourly workers in the United States increased 29,929, or 23.8 per cent, during the year, to a total of 155,765 in 1939.



Electric seam welding machine
Type PMM 2.

RESISTANCE WELDING IN AIRCRAFT CONSTRUCTION

SCI AKY

*Electric resistance welding machines
adopted by*

Douglas Aircraft Co., Inc., Santa Monica, Cal.	10 machines
The Glenn L. Martin Co., Baltimore, Md.	5 machines
Consolidated Aircraft Corp., San Diego, Cal.	3 machines
Curtiss Aeroplane Division, Buffalo, N. Y.	2 machines
Vultee Aircraft Corp., Downey, Cal.	2 machines
Navy Aircraft Factory, Philadelphia, Pa.	



**"SCI AKY" Welding
Equipment adopted
in six months by
twelve prominent
American Aircraft
Manufacturers.**

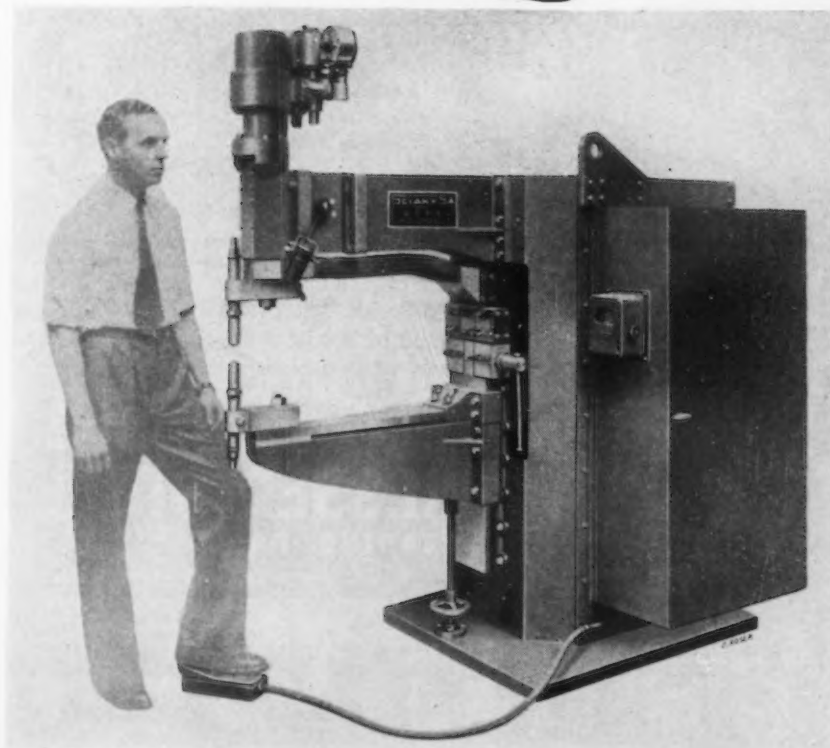
Stored Energy Principle

In the Sciaky welding machine a quantity of electrical energy is accumulated in electro-magnetic form in an iron core reactor, charged during an appreciable period of time by *direct current*, and is discharged in a few thousandths of a second in making the weld. Thus a 40-kva. Sciaky machine will do the work of a 350-kva. conventional spot welder for aluminum alloys. By employing a concurrent variable pressure cycle, sound welds are obtained, free from cracks.

SCI AKY

11001 COTTAGE GROVE AVENUE
CHICAGO, ILLINOIS

Electric spot welding machine type PMCO 2 S.
With stored energy and variable pressure cycle.
The most popular spot welding machine in U.S.
Aircraft Industry.



Steel Exports Decline for Neutral Countries in Europe

HAMBURG—The general situation in the European iron and steel markets is little changed. Export demand is small and Belgium-Luxemburg has experienced a decline of orders from overseas with prices somewhat weaker, particularly for bars and joists.

The severe winter has interfered with traffic (the Danish Isles were cut off from all traffic for a time) and has hampered building operations for a long period. The outlook for the export traffic for the neutral industries is now regarded with less optimism.

In Germany the Leipzig Fair has

attracted much attention, and 18 foreign nations have exhibited. About 22,000 foreign buyers had this year bought the Leipzig Fair Emblem. The export trade is naturally chiefly directed to the Eastern markets. An agreement has been signed with Russia, concerning transit to Iran and Afghanistan. This permits delivery of steel plant equipment for use at a plant which is being built by the Demag near Teheran.

SLOVAKIA. Iron ore mining has been resumed after 60 years in the Zips, production should reach 200,000 metric tons annually. All the ores are sent to Moravia.

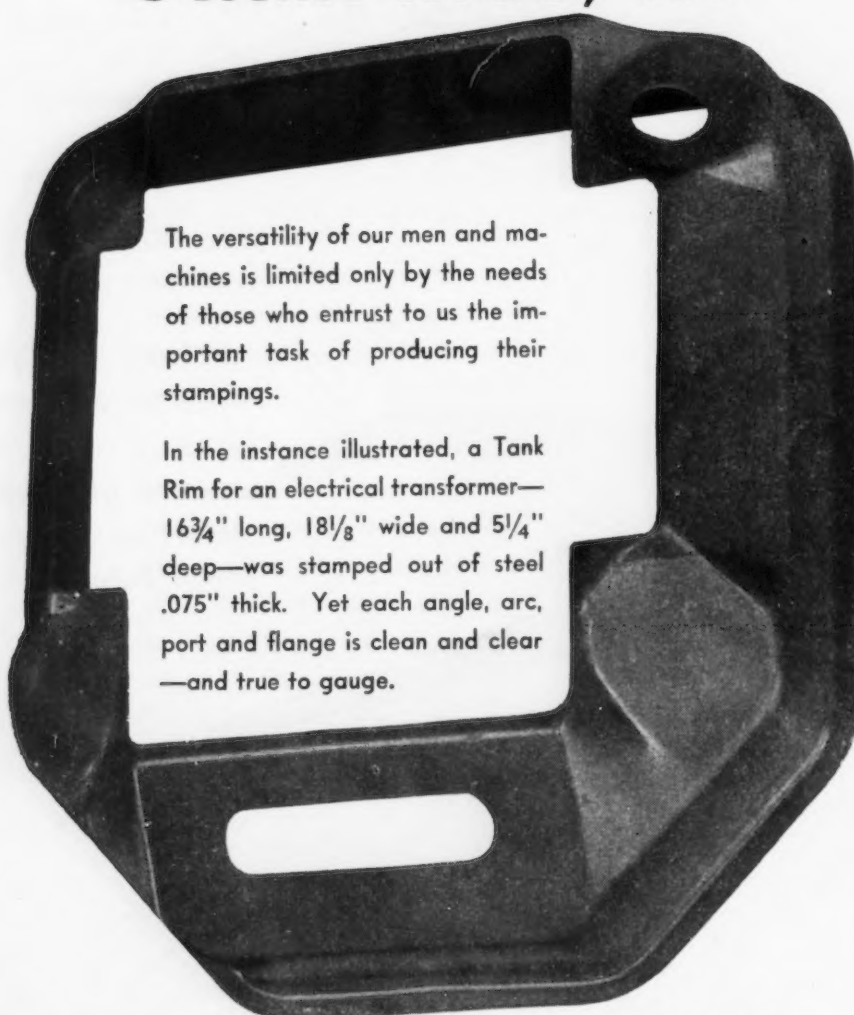
BOHEMIA-MORAVIA. On April 1 the custom barriers with Germany end. The Bohemian-Moravian industry will enter the German steel cartel with an annual allotment based on the present production. The capacity is about 1,600,000 tons of iron and 2,200,000 tons of steel, but steel production will be hardly more than 1,800,000 tons this year due to scarcity of scrap. Prices will be same as in Germany. The secondary industry has not the large German market for exploitation.

RUSSIA. The new trade agreement with Germany provides a yearly mutual exchange amount of about \$410,000,000 on both sides. Germany will resume export of iron and steel to Russia, but the main interest centers in delivery of factory equipment. German experts had advised Russia that the high specialization and development of the decentralized Russian industry are not favorable for the average Russian worker. Germany is preparing to deliver machinery for secondary industries of simple type with easily handled machines for easy repair and mass delivery of equipment for the consumption industry in Russia is already starting. Russia has taken over many of the machines which were on order for overseas, but could not be supplied.

LUXEMBURG. The heavy industry is still working only 21 days per month. Supplies of German coke in exchange for pig iron have been increased, but production is still only 72 per cent of average of last year. The steel industry had at the end of February 2000 men less on the payroll than last year. The smaller industry is doing better, particularly the small foundries.

BELGIUM. The constitution of the Comptoir des Fontes de Moulages (pig iron cartel) in connection with the French - Luxemburgian - Belgian pig iron cartel does not mean—for the near future—resumption of activity in the

LIGHTER GAUGE STAMPINGS, too



The versatility of our men and machines is limited only by the needs of those who entrust to us the important task of producing their stampings.

In the instance illustrated, a Tank Rim for an electrical transformer—16¾" long, 18⅛" wide and 5¼" deep—was stamped out of steel .075" thick. Yet each angle, arc, port and flange is clean and clear—and true to gauge.

Present your problems to Parish. The services of our engineers frequently result in economies of important proportions . . . yet their contributions are not evident in our costs.

Let us review your requirements.

PARISH PRESSED STEEL CO.

READING, PA.

PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

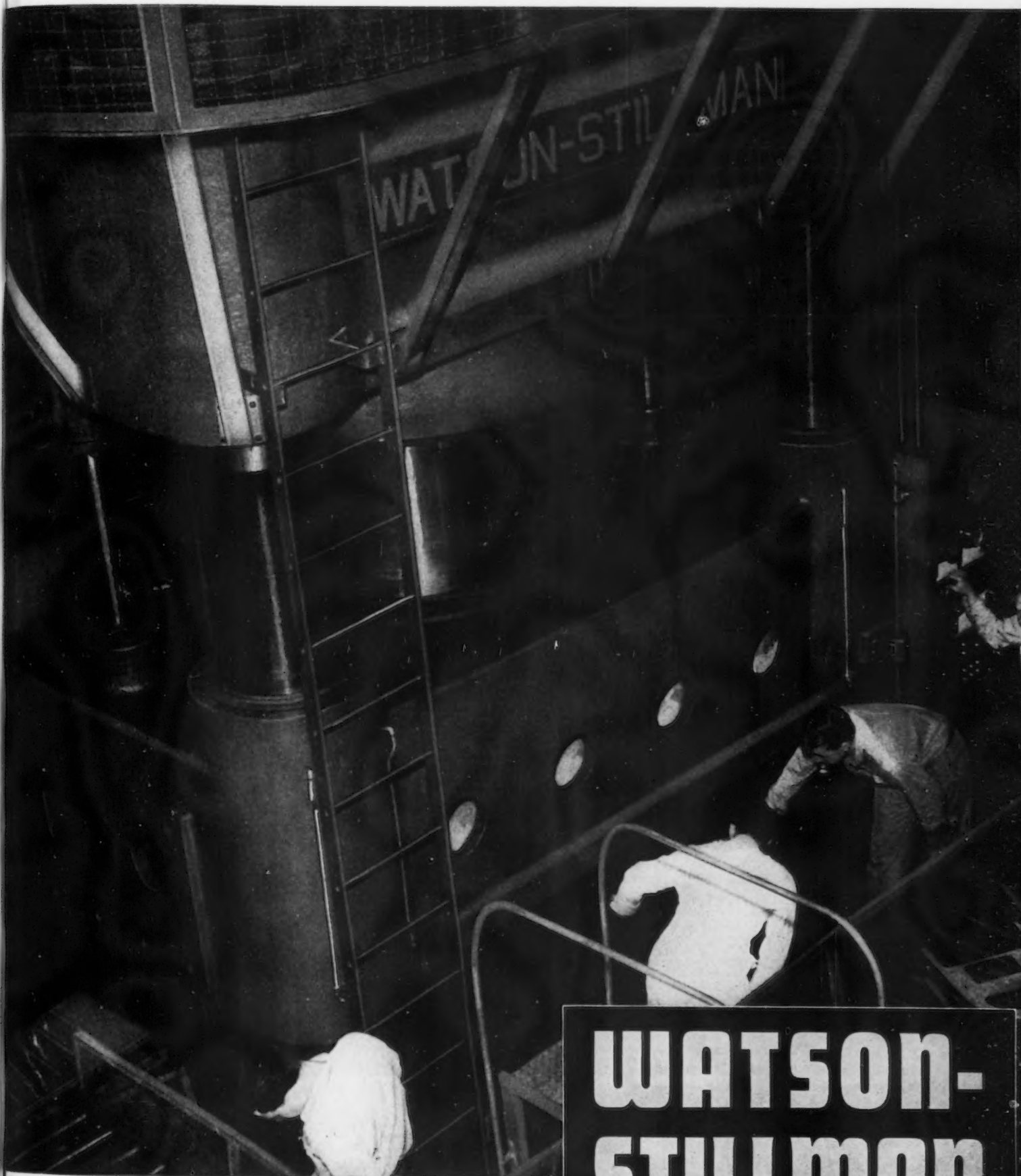
CRITICAL PRESSURES . . . AS IN AIRCRAFT MANUFACTURE

This huge 4,500-ton w-s Hydraulic Forming Press (36" stroke; 40" opening) is shown working on the exceedingly thin metal used in aircraft manufacture. Precision-adjustable pressure control is

vital. All of the operating controls are extremely sensitive . . . quick and sure. Merely press a button—and the machine will stop instantly on a down stroke. (Press another button, and operation is resumed.)

Such Watson-Stillman hydraulic presses are among the pioneering

equipment which has been largely responsible for the extraordinary speed-up technique developed in aircraft production during the past half-dozen years. They are adapted to similarly exacting uses throughout the many automotive fields. Consult the Watson-Stillman engineers.



WATSON- STILLMAN

WATSON-STILLMAN COMPANY • ROSELLE, NEW JERSEY

export market. The comptoir will not sell for export, except to neighboring countries and controls pig iron export to France, as well as to Germany. Later business will be sought also in foreign markets.

YUGOSLAVIA. Since the production at the new works of Caprag has been now started, Yugoslavia is unable to cover her demand for iron and steel. The extension of the Jugostal works of Vares by two new blast furnaces has been decided. Yugoslavia's

importance as supplier of iron ores is constantly rising. Up to a few years before Yugoslavia was unknown as an ore supplier, but now provides Germany and Hungary with increasing quantities.

In the last quarter of 1939 Yugoslavia exported to Hungary and Germany 161,650 tons of iron and manganese ores as compared with 67,365 tons in same period of 1938 and virtually nothing in 1937. This is now expected to raise this quantity at least to 100,000

tons monthly. Yugoslavia is now Europe's principal copper ore supplier, mostly to France and Germany. The average monthly production of copper (smelted) last year was 9510 tons, lead, 3510 tons and of zinc 11,490 tons, but nearly 90,000 tons of copper ores are now exported monthly, of which 60 per cent goes to Germany.

BELGIUM. Belgium's steel industry has recovered from the setback due to shortage of coal and ores. Total 1939 production was 3,068,200 tons as compared with 2,464,600 tons in 1938. The domestic demand is very satisfactory. Demand from the Dutch and the Scandinavian shipbuilding industry is also very large.

SPAIN. Spain produced last year 1,670,412 tons of iron ore. The export demand is small, as Germany of course is unable to get supplies there any more. Before the present war 2,400,000 tons was produced. The blast furnaces of Sagunt will be modernized. The outlook for the ore industry in the north of Spain is regarded with pessimism.

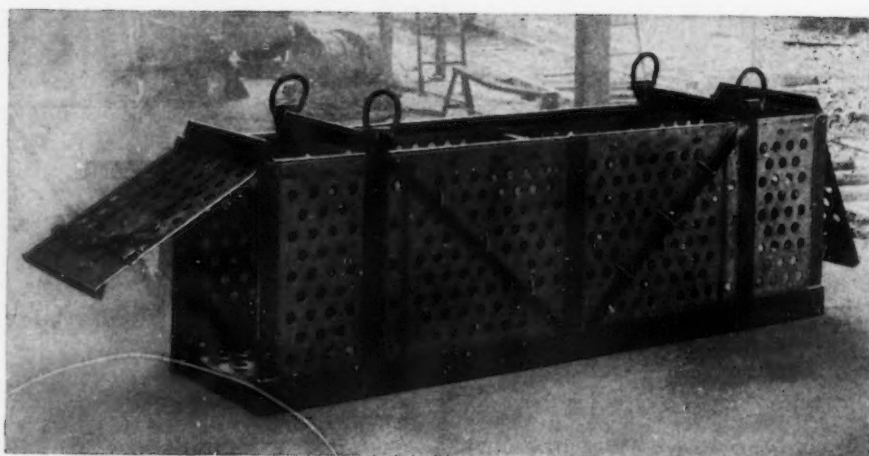
GERMANY. The United Steel Works has again published a dividend of 6 per cent. It is certain that the other steel works will follow with the same dividend. Profits were slightly higher than in 1938. As regards production no details are published, it is only said that production is maintained at "unaltered height."

The scrap supply is now the chief problem. Manganese ores will be supplied from Russia, but while the Danube way was blockaded by the winter, only small supplies were available. The works extension scheme of all steel works, started in 1939, is being carried on. As regards German exports, nearly 70 per cent of total exports during the first two months of this year were taken up by the Balkans.

Scrap Committee Appointed

LEWIS MILLER, Columbia Iron & Metal Co., Cleveland, has been appointed chairman of the railroad scrap committee of the Institute of Scrap Iron and Steel Inc., New York. Amos Bowman, of Luria Bros. & Co., Inc., Pittsburgh, has been named vice-chairman. Other members are: Ben Cohen, Louis Cohen & Son, Wilkes-Barre, Pa.; Saul S. Frankel, Rochester Iron & Metal Co., Rochester, N. Y.; David J. Joseph, David J. Joseph Co., Cincinnati; Harvey Kaplan, M. S. Kaplan Co., Chicago; Abe Luntz, Luntz Iron & Steel Co., Cleveland; William J. Ross, of Hyman-Michaels Co., Chicago; F. Zecchini, of Gutter-son & Gould Inc., Lawrence, Mass.

LIGHTWEIGHT *all-welded Crate*



made from **ROD, BAR and PLATE**

This type of design made possible by the strength and corrosion resistance of Monel . . .

Just because pickling acids and abuse in service play hob with equipment, you don't have to make it heavy. On the contrary, here is an example of rugged strength built into a lightweight crate:

Fabricated by Youngstown Welding and Engineering Company of Youngstown, Ohio, this crate is 11½ ft. long, 2½ ft. wide, and over 3 ft. high. Sides and ends are ¼ inch thick, bottom ⅜ inch. The whole crate is made from standard mill forms employing all-welded construction.

What is the metal? It's Monel . . . the alloy that resists corrosion by pickling acids and so retains its strength. Available in all standard mill forms and easily fabricated into crates and other pickling accessories, Monel assures years of service. And because Monel equipment is lighter in weight, your payloads are bigger, repair and maintenance bills smaller.

How you can take advantage of lightweight Monel construction is told in detail in "Equipment Designs for the Pickle House," "Where Monel pays its Way in Pickling," and "A Good Start to a Better Finish." This literature is free. Write for it today. Address:

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York, N. Y.



MONEL

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

*"What do you desire in
Ferro-Alloys?"*



*Ohio Ferro-Alloys Corporation
Canton, Ohio*

Canada Places \$9,000,000 Order For Motor Vehicles, Ship Work Expands

TORONTO, ONT.—New business booked by various branches of the Canadian iron and steel industry is expanding at a rapid rate and backlogs are mounting to record breaking levels. War contracts continue to hold the spotlight, but pur-

chases for normal activities are appearing in increasing volume. Local steel interests state that bookings of sheets, plates and bars have reached sufficient volume to take care of almost all the Canadian production for the next three months, while deliveries

of plates and sheets have been extended into next July, and new orders continue to appear.

Warehouse operators and consumers in need of quick supplies are turning to United States producers for materials, and it is reported that Canadian offices of American steel companies are being deluged with orders.

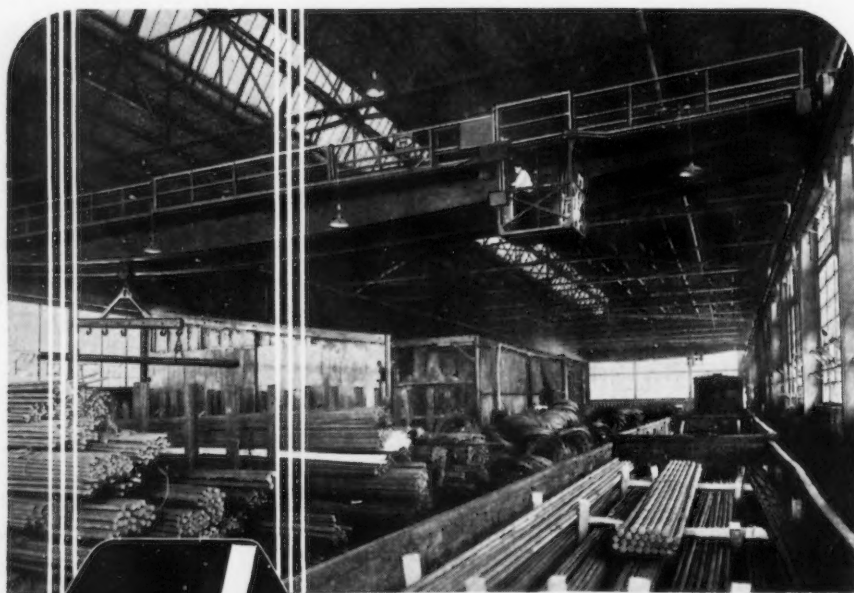
To date shipbuilding contracts totaling upward of \$47,000,000 have been placed with Canadian shipyards for anti-submarine patrol vessels and mine sweepers, and in addition a contract has been given to Halifax Shipyards, Halifax, N. S., to convert the passenger steamship, Prince David, into an armed merchant cruiser at a cost of \$535,000, and Burrard Dry Docks, Vancouver, B. C., will convert the ship Prince Robert, into an armed merchant cruiser at cost of \$600,000. Shipbuilding orders largely are responsible for the heavy demand that has sprung up recently for plates and sheets, but to this business is added demand from the automotive industry, as well as boiler and tank builders.

A large overflow tonnage of plates and sheets continues to go to United States producers. It is reported that most of the steel required for motor vehicles just placed with General Motors of Canada and Ford Motor Co. of Canada, Ltd., involving outlay of \$9,000,000, will go to United States mills, and orders will be placed immediately.

Building Operations Gain

Demand for wire and wire products as well as general small steel lines is becoming more active and production of these materials has been stepped up to meet this growing demand from various parts of the Dominion. Building operations in Canada also are improving steadily with consequent sharp gain in demand for structural shapes and reinforcing steel. The largest order placed during the week was 1000 tons of reinforcing steel for the office building addition for Ontario Hydro Electric Commission, going to Truscon Steel Co. of Canada, Ltd., 124 Bloor Street West, Toronto. For hospital for Hotel Dieu Board, Sherbrooke, Que., Oscar Beaulé, architect. 700 tons of reinforcing bars are pending.

Larger tonnages of structural steel are pending and include 3000 tons for a hotel at Ottawa, Ont., for Ford Hotels Co., Rochester, N. Y.; 500 tons for convent at Amos, Que., of which Jules Caron, 324 Bonaventure Street, Three Rivers, Que., is architect; 200 tons, school for School Commission of St. Leo de Westmount, Westmount,



*America's Oldest
and Only Crane
Builder Producing
Complete Electrical
Crane Equipment.*

ELECTRIC CRANES

Capacities from 5 to 300 Tons

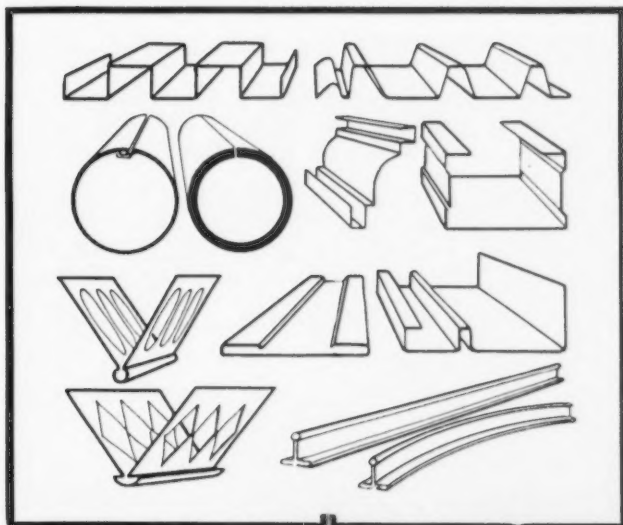
• Whatever your particular task in the handling of heavy materials may be, you can be sure they will be thoroughly understood by P&H crane engineers. As America's leading builders of overhead handling equipment, more than 50 years' experience in building more than 10,000 electric cranes is at your command. To meet your requirements in the most prompt, efficient manner, call in a P&H engineer.

General Offices: 4401 W. National Ave., Milwaukee, Wis.

HARNISCHFEGER
CORPORATION
ELECTRIC CRANES • EXCAVATORS • ARC WELDERS  HOISTS • WELDING ELECTRODES • MOTORS

McKAY

Cold Roll Forming Machines



From the smallest to the largest, the design features are included which make McKay equipment superior in quick change-over, low maintenance, high production and long life. This includes:

1. "McKay McKrometer" roll pressure adjustment and recording of correct settings.
2. Single speed, two or three speeds or variable speed to give required flexibility
3. Unit removable guide and straightener assemblies which can be changed without disturbing vital settings.

PRODUCTS

Budd-McKay Sheet Processing Machines
Two and Four Hi Levellers
Cold Forming Machines
Scrubbing Machines
Oiling Machines
Strip Uncoilers
Strip Recoilers
Scrap Bundlers
Up-Cut Shears
Conveyor Tables
Rotary Slitters
Sheet Dryers
Tool Steel Rolls

NEW PRODUCTS

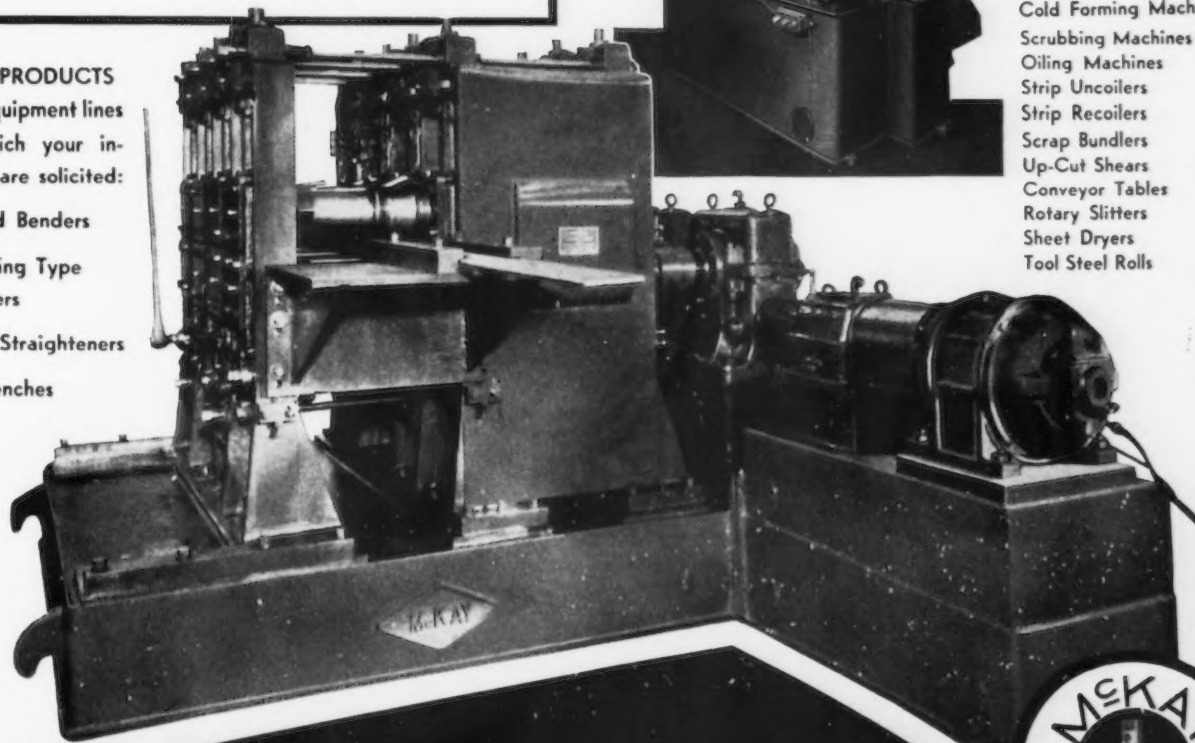
New equipment lines for which your inquiries are solicited:

Pyramid Benders

Wrapping Type Benders

Shape Straighteners

Drawbenches



THE McKAY MACHINE CO

ENGINEERS AND MANUFACTURERS OF SHEET, TIN AND STRIP MILL EQUIPMENT
YOUNGSTOWN, OHIO



Que.; 300 tons for I.O.O.F., building at Hamilton, Ont., F. W. Warren, 66 King Street East, architect; 300 tons for exchange building at Sudbury, Ont., for Bell Telephone Co. of Canada, Ltd., 76 Adelaide Street West, Toronto; 400 tons for Y.M.C.A. building at Vancouver, B. C., McCarter & McCarter, Marine Building, architects; 200 tons for hospital wing for Royal Jubilee Hospital, Victoria, B. C., and 200 tons for ice and sports arena at Victoria, B. C., for Junior Chamber of Commerce.

Orders placed by the War Supply Board during the week include, 7302 vehicles costing \$9,000,000 divided almost equally between Ford Motor Co. of Canada, Ltd., Windsor, Ont., and General Motors of Canada, Oshawa, Ont. The contract calls for service trucks, lorries and tractors.

Other War Contracts

Other contracts placed by the board had total value of \$2,148,320, with the most important being as follows:

Aircraft supplies: Lockheed Aircraft Corp., Burbank, Cal., \$428,313; Canadian Wright, Ltd., Montreal, \$316,678; British Air Ministry, \$130,036; Canadian Vickers, Ltd., Montreal, \$15,356. Metallic Roofing Co. of Canada, Ltd., Toronto, received contract for supplies at \$201,670; Saint John, N. B., Iron Works, Ltd., \$10,710.

Machinery and tools: Gray Bonner Tool Co., Ltd., Ottawa, \$18,792; Engineering Tool & Forgings, Ltd., St. Catharines, Ont., \$11,880; Vivian Engine Works, Ltd., Vancouver, B. C., \$8,600; Silver Agencies, Ltd., Halifax, N. S., \$6,560; Singer Sewing Machine Co., Toronto, \$6,238; Canadian Fairbanks-Morse Co., Ltd., Ottawa, \$3,264.

Electrical Equipment: Canadian Marconi Co., Montreal, \$166,060; International Harvester Co., Ltd., Montreal, \$19,202; Canadian Wire & Cable Co., Ltd., Montreal, \$38,089.

Munitions: Dominion Engineering Co., Ltd., Montreal, \$128,150; Hudson Bay Mining & Smelting Co., Ltd., Winnipeg, Man., \$13,095.

Construction Contracts: Ontario Construction Co., Ltd., St. Catharines, Ont., for work at Malton Air Port, Malton, Ont., at \$152,590; George C. Abbott, Ltd., Toronto, for work at R.C.A.F. station at Camp Borden, Ont., \$53,000.

Ford to Expand

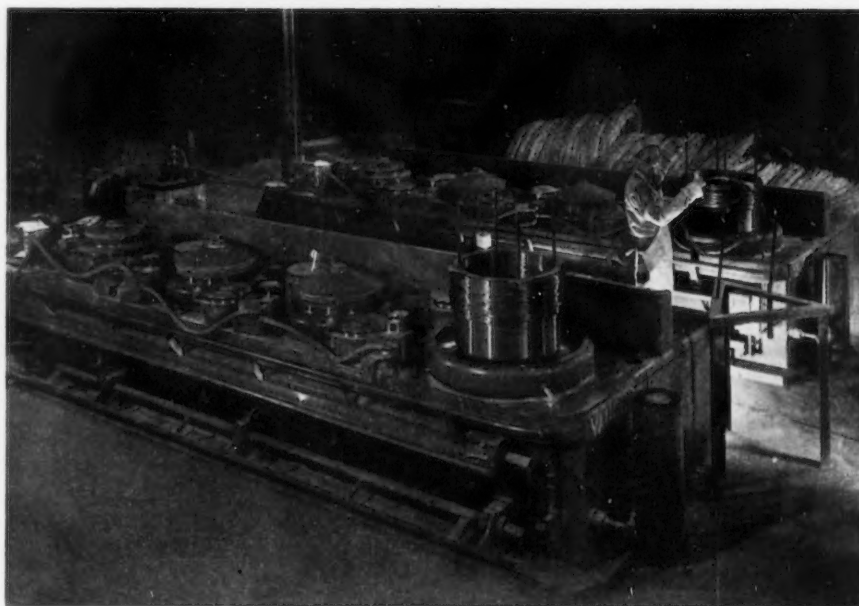
To facilitate production at its Windsor, Ont., works, Ford Motor Co. of Canada, Ltd., is spending approxi-

mately \$1,175,000 on additions and improvements. The program includes remodeling powerhouse building, installing experimental and service school department, new employment office, modern plant hospital, adding new equipment for foundry and machine shop, completion of program to modernize power plant to cost \$110,000.

Officials of Canadian Car & Foundry Co., Ltd., Montreal, Que., announce that backlogs have been increased by

approximately \$2,000,000 by a guaranteed contract which will utilize units of the company that have been idle for some years. Orders for rail, tramway and aircraft equipment, exclusive of contracts, under authority of Canadian Associated Aircraft, Ltd., are approximately \$12,000,000 for the current year. The latest business is in addition to renewals of contracts for Hurricane fighter planes being produced under direct orders from the British Government at the company's Fort William, Ont., Plant.

WIRE-DRAWING..



THESE 4-HR Vaughn Wire-Drawing Machines, equipped with an adjustable speed motor for each spindle and operated by a simple method of control developed by EC&M, are giving excellent results in drawing high carbon wire.

Although the weight of the wire added to the last spindle increases the flywheel effect of the last motor-drive, EC&M has engineered a system of control which compensates for this condition automatically. The EC&M Full Magnetic Controller is designed to distribute the dynamic braking torque in proportion to the inertia of each spindle so that all spindles stop *uniformly* . . . under any condition of load.

And when ready to strip a coil, EC&M allows the last or gathering spindle to be backed up easily by hand, permitting slack in the wire when a finished coil is to be removed.

This unique method of control for wire-drawing machines gives superior operating results. Consult our nearby sales office for complete data.

**Smoother Starting and Stopping
with EC&M Engineered WIRE-**

British Scrap Prices Advanced 5 to 10s.

LONDON—The main range of British maximum prices of iron and steel scrap have just been increased by from 5 s. to 10 s. per ton under a new order effective immediately. Adjustments to meet changing conditions have led to larger increases in a few cases.

By this advance of prices—the first general increase since the outbreak of war—the authorities hope to tap a

large source of supply hitherto almost untouched by the scrap campaign. It is hoped, for example, that manufacturers will now consider the demolition of old and obsolescent plant, etc., a more attractive proposition. If the response is sufficiently large the increase, it is pointed out, may not in the long run affect steel-making costs, since the trade would be able to economize somewhat on purchases abroad. But foreign purchases will continue heavy.

However, there is no doubt about

the rising trend of British steel-making costs. Already some sections of the trade are urging a price advance on this account, and a moderate increase could probably be justified by the present cost factor. But the authorities are thought to be resisting the claims for higher prices until they are entirely satisfied that the heavier costs burden of the whole industry warrants it. When an advance is made it will be a general one embracing the entire industry. This general advance may be held off for another month or two.

MACHINES by VAUGHN Control by EC&M

**What has the Control
to do with
Easier Stripping!**



Note the simplicity of this EC&M Controller for these Vaughn MOTOBLOX. It is built with LINE-ARC Contactors and NEO-TIME Acceleration!



HEAVY DUTY MOTOR CONTROL
FOR CRANES, MILL DRIVES AND
MACHINERY • BRAKES • LIMIT
STOPS • LIFTING MAGNETS AND
AUTOMATIC WELD TIMERS.

**— Easier Stripping
DRAWING MACHINE Control**

South Africa to Expand Its Steel Industry

LONDON—J. H. Van der Bijl, chairman of the South African Iron & Steel Corp. forecasts a great expansion of the South African steel industry. The present works at Pretoria, whose capacity is 340,000 ingot tons annually, is being expanded to a capacity of 440,000 ingot tons annually. New mills are also to be established whose capacity will eventually equal that of the present works. The Pretoria mills now supply one-fourth of South Africa's steel needs. Demand for steel is advancing so swiftly however, that even with the extensions and new works the domestic industry is hardly likely ever to supply more than this proportion.

Standard Can Co. Is Organized at Pittsburgh

PITTSBURGH—Standard Can Co., which will make steel pails for paint and varnish, oil and cement containers and roofing products, etc., with an initial employment of about 50 persons, and a capitalization of \$50,000, has been organized here. Factory space has been contracted for on Columbus Avenue here. Operations are expected to begin by May 1. P. W. Hatfield is president and M. Moss, secretary-treasurer.

Trade Notes

St. Louis Steel Products Co., John G. Hermann, president, manufacturer of steel wire products, will move on April 1 from 1509 North Broadway to a building it has purchased at 2209-15 Chestnut Street.

Cooper-Bessemer Corp., marine, oil field and stationary diesel engines, Mount Vernon, Ohio, has opened a branch office in Arcade Building, St. Louis, with W. S. Arthur, manager.

Michigan Foremen's Conference April 13

THE second annual Foremen's Conference in Michigan will be held Saturday, April 13, at the Horace H. Rackham School of Graduate Studies at the University of Michigan, Ann Arbor. Morning sessions, following registration at 9 A.M., will be presided over by L. Clayton Hill, Murray Body Corp., Detroit. Greetings will be extended by Lewis M. Gram, professor of civil engineering, chairman of the

Department of Civil Engineering and Director of Plant Extension, University of Michigan. Response will be made by A. C. Horrocks, Goodyear Tire & Rubber Co., Akron. The principal morning address will be delivered by Malcolm W. Bingay, editorial director, The Detroit Free Press. The speaker at the luncheon will be Charles F. Kettering, general manager, Research Laboratories Division, General Motors Corp.

During the afternoon 10 simultaneous conferences will be held:

1. "How to say 'No' and When," Pro-

fessor Russel J. Greenley, chairman, Trade and Industrial Education, Purdue University, Lafayette, Ind. F. G. Varney, Upjohn Co., Kalamazoo, Mich., presiding.

2. "A Program for Self Improvement," George H. Fern, director, Michigan State Board of Control for Vocational Education, Lansing, Mich., W. F. Sherman, Detroit editor, THE IRON AGE, presiding.

3. "The Most Important Elements in the Foremen's Personnel Relations as They Affect Accident Prevention," George Opp, safety engineer, The Detroit Edison Co. Professor Thomas Diamond, Department of Vocational Education, University of Michigan, presiding.

4. "The Practical Use of Psychology," C. S. Coler, industrial relations, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. R. A. Hayward, president, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., presiding.

5. "What Do Men Have a Right to Expect From Their Foremen?," Harry J. Kelley, manager, industrial relations, American Seating Co., Grand Rapids, Mich. Clement J. Freund, dean, College of Engineering, University of Detroit, presiding.

6. "Streamlined Foremanship — 1940," A. A. Nicholson, Texas Co., New York City. H. M. Tallafiero, president, American Seating Co., Grand Rapids, Mich., presiding.

7. "Cub Foremen," Ezra Clark, Clark Equipment Co., Battle Creek, Mich. B. S. Epps, Consumers Power Co., Jackson, Mich., presiding.

8. "How Can We Increase the Desire of Workmen to do a Good Job?," Professor John W. Riegel, director of Bureau of Industrial Relations, University of Michigan. Carl Herrick, Postum Co., Battle Creek, Mich., presiding.

9. "Organization and Management," L. A. Appley, Socony Vacuum Oil Co., Detroit. John Alrey, vice-president and general manager, King Seeley Co., Ann Arbor, Mich., presiding.

10. "The Foremen's Responsibilities in a Training Program," Vernon G. Schaeffer, assistant professor of Psychology, Extension Services, Pennsylvania State College. P. W. Rhame, work manager, A. C. Spark Plug Co., Flint, Mich., presiding.



An Assist! By **ATLAS**
View at Prominent Iron Foundry

To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket rolls down to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket rolls down to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers

CLEVELAND, OHIO

Manufacturers

serving the world with mobile handling equipment

80 Students Learning Industrial Purchasing

DETROIT — An industrial purchasing course being conducted here at Wayne University has attracted 80 students—believed to be the largest group studying industrial purchasing in any school in the country. The class started Feb. 14 with an initial enrollment of nearly triple the number expected. Classes are held on Wednesday and Thursday night each week with R. G. Matley, purchasing agent for Whitman & Barnes Co., as instructor.

Bullard Orders Gain

BULLARD Co., Bridgeport, Conn., reports its unfilled orders on March 1 totaled \$4,250,000, compared with \$4,184,000 on Jan. 1, last, and with \$529,000 on Jan. 1, 1939.

The company has produced no special purpose machinery for war products, although many of its machines have entered into production of war materials. E. P. Bullard, president, reports. On March 1, 51 per cent of the company's orders consisted of domestic business, 37 per cent Allied business and the balance other foreign orders.

6 A. S. M. Chapters Will Meet May 3-4

SIX chapters of the American Society for Metals will hold their fourth biennial meeting May 3-4 at State College, Pa., where a technical program will include two papers on "High Temperature Alloys," presented by C. L. Clark, University of Michigan, and J. J. Kantner, Crane Co., Chicago, on Friday, May 3. A second technical session, to be held the following Saturday, will include two papers on the "Hardenability of Steel" by M. A. Grossmann, Carnegie-Illinois Steel Corp., Chicago, and W. E. Jominy, General Motors Corp., Detroit.

Co-chairman at the Friday session will be H. J. French and Francis Foley, with V. N. Krivobok and N. L. Mochel directing discussion. Co-chairman at the Friday meeting will be E. C. Bain and C. H. Herty, with G. V. Luerssen and Howard Scott as discussion leaders. Dr. Walter Mathesius, vice-president, United States Steel Corp., will speak at a dinner at 6 p.m. Friday at Nittany Lion Inn.

A. I. S. E. Honors Clauss At "President's Hour"

DETROIT—As a special tribute to J. A. Clauss, president, Association of Iron and Steel Engineers, the Detroit district section observed a "president's hour" in his honor at the March meeting at the Detroit-Leland Hotel.

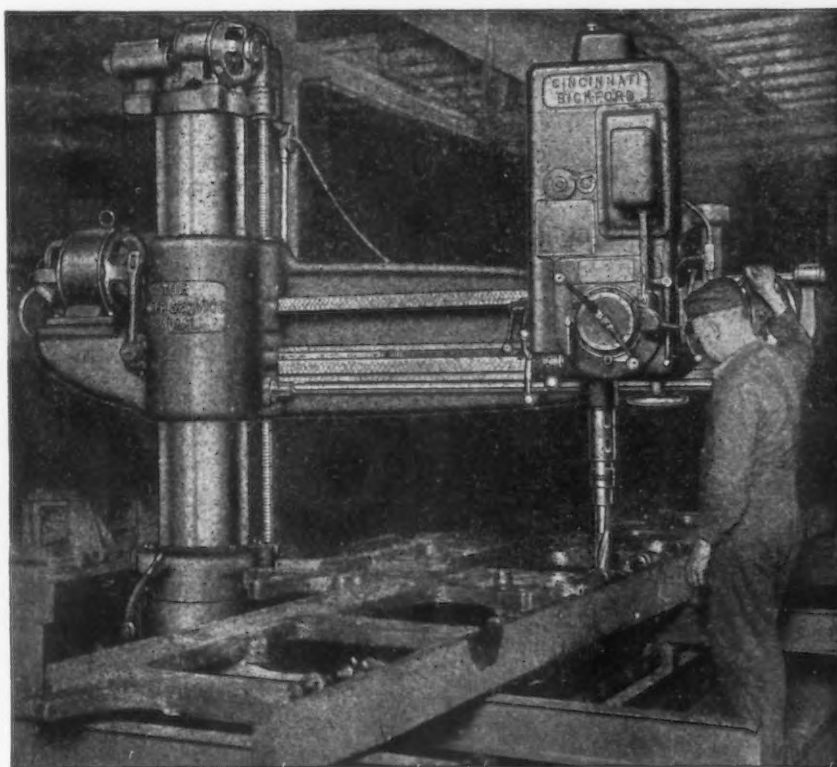
Mr. Clauss, chief engineer of Great Lakes Steel Corp., and past chairman of the Detroit Section, was presented with a photograph album and a series of 35 slides for projection made from pictures taken during his life. These slides were shown at the meeting accompanied by running comment by G. R. Scott, gear consultant, Michigan Tool Co. The slides and a photograph album were presented to Mr. Clauss by H. J. Hall, Detroit Edison Co.

The technical session following the president's hour included papers on "Gas Mixing and Distribution at the Great Lakes Steel Corp." by W. H. Collison, assistant superintendent, coke plant, and F. C. Frye, steam and fuel engineer, at the plant at Ecorse, Mich. They pointed out that a steel company operating coke ovens and blast furnaces is faced with a problem of utilizing by-product gases from those opera-

tions, not only to prevent waste of gas, but also to provide better and more economical operations. The plant in question has available as fuel coke oven gas, blast furnace gas, coke breeze and oil, which are distributed to the coke plant boiler house, blast furnace stoves, a neighboring utility company and the steel mill. The method of mixing and compressing the gases which are burned in the open hearth furnaces, soaking pits, slab heating, merchant mill, normalizers and annealing furnaces, was discussed in detail.

Carnegie-Illinois Erects New Building at Ohio Works

YOUNGSTOWN—Carnegie - Illinois Steel Corp. is moving sintering machinery and auxiliary equipment from its idle Joliet, Ill., plant to a new building at the south end of the Ohio works' ore yard. The sintering plant here for reclaiming iron ore from blast furnace dust will have an approximate capacity of 500 net tons a day.



Convenient Low Controls At the Head Essential for Work Like This

Especially on big work centralized control at the drilling position makes important savings. Controls for all speeds and feeds—electric column clamping—arm clamping and elevation to the arm—power rapid traverse—controls for these and all other operations of the SUPER SERVICE RADIAL DRILLS are always within easy reach from the drilling position. Think what time and energy are wasted when that is not the case! Yet most of the radial drills in use today do not have this money saving feature of 100% centralized control at the head. Do yours?



Write for Bulletin R-24.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

... THE NEWS IN BRIEF ...

Automobile production is steady. Stocks of cars fairly heavy, but are expected to be absorbed by spring demand.—Page 52.

Republic Steel Corp. pays \$6 dividend on 6 per cent cumulative convertible preferred stock.—Page 54.

Curtailement of Army's educational orders urged because of war orders from foreign governments.—Page 56.

ICC member resigns to head tin foil manufacturing company.—Page 56.

Delay in consideration of scrap export licensing bill is sought by Department of State.—Page 58.

Roosevelt reported weighing proposal to launch spend-lead drive before election.—Page 58.

Government awards for iron and steel products under Walsh-Healey Act \$1,422,544 for week ended March 16.—Page 60.

Blast furnace capacity for producing pig iron and ferro alloys declined in 1939.—Page 62.

Three members of ICC condemn abuses in ordering and supplying of freight cars.—Page 62.

Inland Steel Co. to replace bonds with lower rate issue.—Page 62.

Industry acknowledges its responsibilities, H. W. Prentis, Jr., tells industrialists at Pittsburgh.—Page 64.

Ohio State offers 3-day course in welding engineering.—Page 64.

Steel exports decline for neutral countries in Europe.—Page 66.

Lewis Miller, Columbia Iron & Metal Co., appointed chairman of railroad scrap committee.—Page 68.

Canada places \$9,000,000 order for motor vehicles with Ford and General Motors.—Page 70.

British scrap prices advanced 5 to 10s. Steel prices may also go higher.—Page 72.

George S. May Business Foundation to do research in interests of private enterprise is organized at Chicago.—Page 73.

Standard Can Co., capitalized at \$50,000, is organized at Pittsburgh.—Page 73.

South Africa to expand its steel industry.—Page 73.

Bullard Co., Bridgeport, Conn., reports 51 per cent of orders domestic business, 37 per cent for Allies.—Page 74.

Eighty students attend industrial purchasing course at Wayne University, Detroit.—Page 74.

Second annual Foremen's Conference in Michigan scheduled for April 13 at Ann Arbor.—Page 74.

Carnegie-Illinois Steel Corp. moves Joliet sintering equipment to the Ohio works at Youngstown.—Page 75.

Association of Iron and Steel Engineers, Detroit chapter, honor J. A. Clauss at "president's hour."—Page 75.

Six chapters of American Society for Metals will hold fourth biennial meeting, May 3-4, at State College, Pa.—Page 75.

C. E. Wilson to be A.F.A. board of awards lecturer.—Page 78.

Program for Westinghouse machine tool electrification forum is announced.—Page 78.

National Industrial Advertisers Association to hold 18th annual conference, Sept. 18-20, in Detroit.—Page 78.

Representatives of employers, employees debate Wagner Act at Chicago.—Page 79.

A.F.A. Chapters plan regional meetings.—Page 79.

Fabricated structural steel contracts in February 18 per cent above January.—Page 83.

Columbia Tool Steel Co., Chicago Heights, Ill., will build new melting shop.—Page 83.

Purchases of iron and steel products by Class I railroads in 1939 total \$273,968,000.—Page 87.

Expansion of demand for refrigerating equipment is reported by Wisconsin company.—Page 87.

Warner & Swasey Co. will build plant addition to increase capacity for manufacture of turret lathes.—Page 87.

Bethlehem Steel Co. to erect five new buildings and relocate 12-in. bar mill at Lackawanna plant.—Page 87.

Omaha steel warehouse announces new prices on hot rolled and galvanized steel items.—Page 87.

H. W. Graham, of Jones & Laughlin Steel Corp., to discuss metallurgical problems of bessemer process at A.I.M.M.E. meeting.—Page 87.

Aluminum Co. of America reduces prices of aluminum.—Page 104.

January imports of manganese ore containing 35 per cent or more manganese totaled 80,537 tons.—Page 108.

February sales of electric industrial trucks \$288,820, contrasted with \$273,383 in January.—Page 108.

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MEETINGS

- April 10 to 12—International Acetylene Association, annual convention, Milwaukee.
- April 11 and 12—Galvanizers Committee of American Zinc Institute, annual spring meeting, Pittsburgh.
- April 25 and 26—Concrete Reinforcing Steel Institute, 16th annual meeting, Hot Springs, Va.
- May 6 to 8—Machine tool electrification forum, East Pittsburgh works of Westinghouse Electric & Mfg. Co.
- May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.
- May 7 and 8—Society of Automotive Engineers, national production meeting, Hartford.
- May 13 and 14—Spring meeting, Associated Machine Tool Dealers of America, Atlantic City, N. J.
- May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.
- May 21 and 22—Annual convention, National Metal Trades Association, Biltmore Hotel, New York.
- May 23—American Iron and Steel Institute, annual meeting, New York.

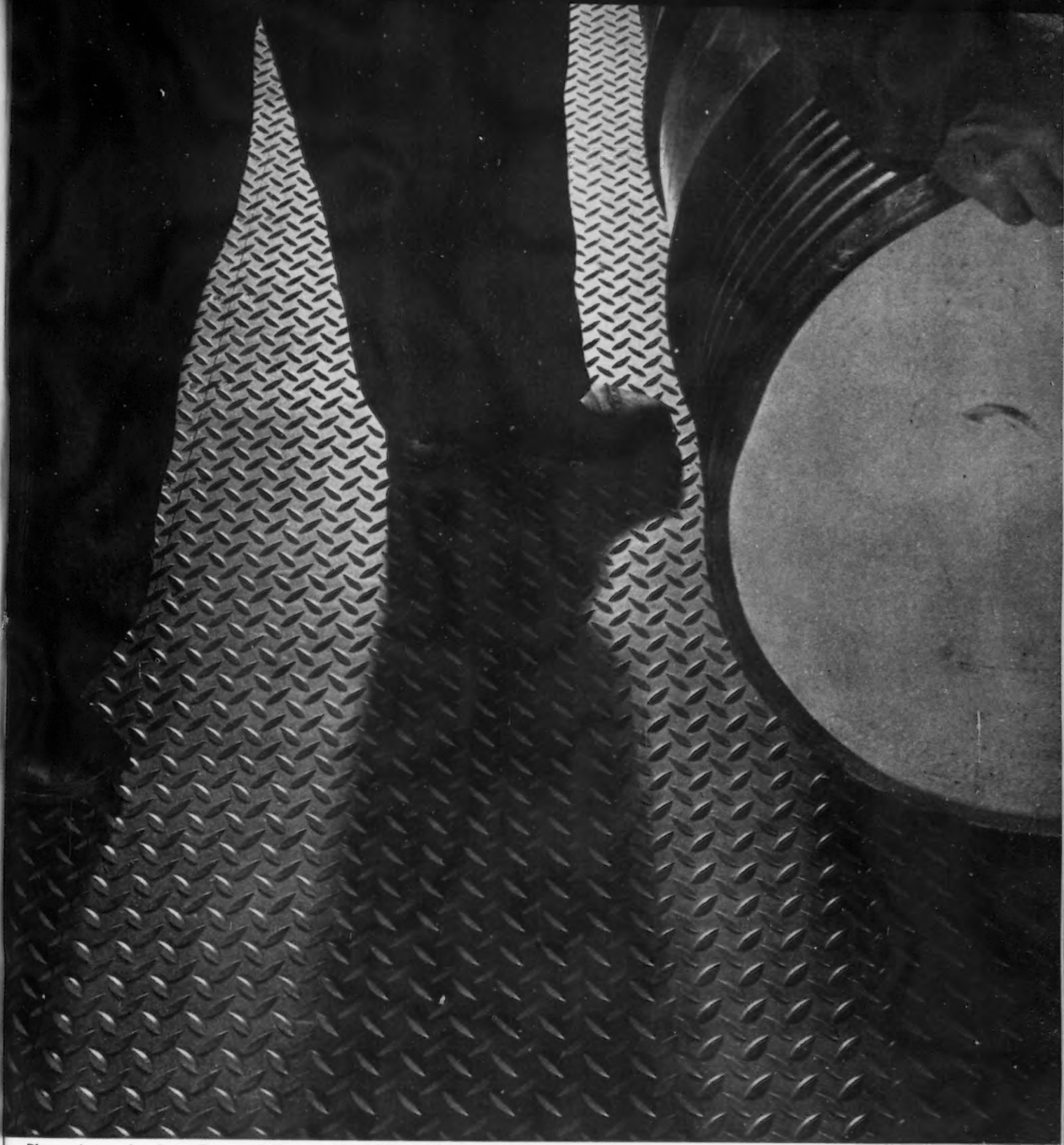


Photo shows the Super-Diamond Pattern of "A.W." Rolled Steel Floor Plate. Provides safe tread from any angle, under any condition.

For every "floor trouble zone" . . . Some floors are habitually damp or greasy. Others quickly become hazardous. "A.W." Rolled Steel Floor Plate eliminates floor trouble zones because it is permanently non-skid. Prevents costly slipping and falling accidents. Reduces maintenance expense. Oil-proof, heat-proof, fire-proof, crack-proof. Easy to clean, quick to drain. Can be cut to any shape and installed almost overnight. Write for folder giving complete engineering data on "A.W." Rolled Steel Floor Plate.

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C. E. Wilson to Be A.F.A. Board of Awards Lecturer

CHARLES E. WILSON, executive vice-president, General Motors Corp., will deliver the Board of Awards lecture at the annual convention of the American Foundrymen's Association in Chicago, May 4 to 10. Mr. Wilson's lecture will deal with some phases of business management.

One of the features of the convention will be a demonstration of crystal

formation of metals by Dr. C. W. Mason of Cornell University. Through the use of a microscope projector, Dr. Mason will show on the screen material freezing from the molten to the solid state.

Plant visitations available to foundrymen attending the convention include Wisconsin Steel Division and McCormick and Tractor plants of International Harvester Co., South works of Carnegie-Illinois Steel Corp., Interlake Iron Corp., Crane Co., Link-Belt

Co., Continental Roll & Steel Foundry Co., American Steel Foundries, Allied Steel Casting Co., Griffen Wheel Co., Western Electric Co., Whiting Corp., National Malleable & Steel Castings Co., and Chicago Malleable Iron Co.

Industrial Advertisers Plan 18th Annual Meeting

INDUSTRIAL advertising and marketing executives of the United States and Canada will meet at the Hotel Statler in Detroit, Sept. 18-20, for the 18th annual conference of the National Industrial Advertisers Association.

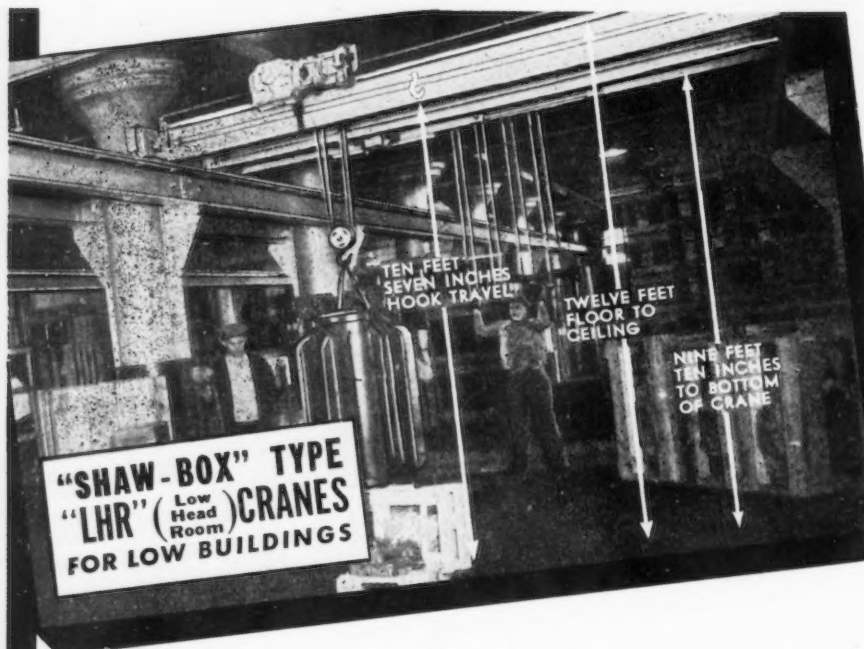
The conference is being sponsored by the Industrial Marketers of Detroit, local chapter of the N.I.A.A. The Toledo Industrial Advertisers Club, Toledo chapter, will act as co-hosts. Plans for the conference are being formulated by a general conference committee under the chairmanship of Lloyd R. Vivian, Ditzler Color Co., Detroit, and president of the Industrial Marketers of Detroit, E. C. Howell, Carboly Co., Detroit, is vice-chairman of the conference committee, whose membership includes: Henry F. Belcher, Insto Gas Co.; Athel F. Denham, Denham & Co., agency; Henry G. Doering, The Truscon Laboratories; Peirce Lewis, THE IRON AGE; C. C. Mercer, Ex-Cell-O Corp.; Tom Moule, Seiler, Wolfe & Associates, agency; and Phillip Ruprecht, McGraw-Hill Publishing Co., Inc., all of Detroit.

New Electrical Applications At Westinghouse Forum

NEW electrical features and applications available to solve problems of the machine tool builder will be discussed at the Machine Tool Electrification Forum, to be held May 6-8 at the East Pittsburgh works of the Westinghouse Electric & Mfg. Co.

Application of electric drive and control for special-purpose grinding machinery will be outlined by Roger S. Pyne, chief engineer, Van Norman Machine Tool Co., Springfield, Mass., and problems of control, wiring and installation will be discussed by D. K. Frost, electrical engineer, Mattison Machine Works, Rockford, Ill.

Synchro-tie apparatus, the "electrical lineshaft" for keeping machine functions in step with each other, will be described in theory and actual application. Don Lee Hadley, Westinghouse consulting designer, will demon-



LOW BUILDINGS? - You Needn't Raise the Roof To Have the Crane Service You Need!

A "Shaw-Box" 3-ton capacity "LHR" Crane (Patented) installed in a building 12 feet high (inside), and 30 feet wide gives a hook lift of 10 ft. 7 inches and makes available more usable space beneath it than any other standard crane . . . This standardized, mass production built, 3-motor crane costs about the same as the average "electric hoist type" crane . . . Included in its modern

design are the advantages of all steel totally enclosed construction; ball bearings throughout; speeds to suit today's tempo; top running trolley; and unusual accessibility of all parts.

Two standardized lines of Low Head Room Cranes, — "LHR" in 1, 2, and 3 tons capacity; and "L" in capacities 3½ to 15 tons . . . Send for dimension tables, descriptions, and illustrations of applications that increase production in limited spaces.



Makers of all types and sizes of Electric and Hand Operated Cranes; "Load Lifter" Electric Hoists; and the famous Portable Electric "Budgit" Hoists . . . Send all your inquiries for cranes and hoists to "Shaw-Box!"

SHAW BOX CRANE & HOIST DIVISION

MANNING, MAXWELL & MOORE, INC.

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MUSKEGON, MICHIGAN

strate the principles of industrial design, applied to utilitarian motors and control apparatus.

At their option, the guests may visit interesting sections of the East Pittsburgh works, the research laboratory and other company facilities.

Other topics scheduled for discussion are:

May 6, p. m.—Tachometer generators and built-in instruments; apprentice training for machine tool operators; and electrical equipment for hydraulic presses.

May 7, a. m.—Electric drive and control for special-purpose grinding machines; adjustable-speed drives for a-c. supply (a) a-c. motor with regulator type control, (b) simplified variable-voltage system, (c) apparatus demonstration; and fractional-hp. motor demonstration.

May 7, p. m.—Special user and code requirements for control wiring and installation; "Salesman Sam" contacts the machine tool builder; and proposed re-rating of small integral hp. motors.

May 8, a. m.—Synchro-ties for machinery application; typical wiring arrangements for basic control functions; and "streamlining" in electrical equipment design.

May 8, p. m.—Open forum and plant inspections, followed in the evening by the annual dinner.

Wagner Act Debated

CHICAGO—At a panel discussion on the Wagner Act sponsored by the Chicago Junior Association of Commerce, speakers from labor and management last week gave their opinions as to how the act answers industrial relations problems. Van A. Bittner, regional director, SWOC, declared: "The inherent strength and the fundamental right of the act is the undisputed fact that it has worked in thousands of cases, notwithstanding the bitter fight that has been made against it by union-hating employers who have spent millions of dollars of stockholders' money."

Roy C. Ingersoll, president, Ingersoll Steel & Disc Division, Borg-Warner Corp., said that the act has encouraged the growth of large labor organizations with tremendous political power by allowing employees as represented by their unions to proceed without restraints, while the employer is hampered by the regulations of the act.

The minority is enslaved by the act's provision that the majority of employees shall have exclusive bargaining powers, according to A. J. Smith, general counsel, Illinois Manufacturers' Association.

Garnet L. Patterson, regional director of the NLRB, said the act provides a tribunal where violations of the right to bargain collectively can be corrected.

Daniel D. Carmell, AFL counsel, closed the discussion by declaring that

the employer was protected by the act when he enters into agreements with unions, and that it is, therefore, a move in the right direction.

A.F.A. Chapters Plan Regional Meetings

PROGRAMS for three regional foundry conferences sponsored by chapters of the American Foundry-

men's Association and various engineering schools were announced recently.

The fourth New England conference, scheduled for March 29 and 30, will be held at the Massachusetts Institute of Technology, Cambridge, Mass. Papers to be read at this meeting are: "A Small Foundry's Attempt to Stimulate Individual and Group Safety Consciousness and Health Betterment," by P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, Ohio;

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MANUFACTURERS OF
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HORIZONTAL BORING, DRILLING and MILLING MACHINES

"Manganese Bronze," by S. W. Chappell, Sr., Electric Boat Co., Groton, Conn.; "Practical Cupola Practice," by Horace A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.; "Proper Preparation and Testing of Rebonded Sand," by N. J. Dunbeck, Eastern Clay Products, Inc., Eifort, Ohio; "Shrinkage in Non-Ferrous Castings," by David Tamor, Reading Pratt & Cady Division, American Chain & Cable Co., Hartford, and "Production Pattern Equipment," by

Vaughan Reid, City Pattern Works, Detroit.

Other features of the conference are addresses by E. L. Moreland, dean of engineering, Massachusetts Institute of Technology, and Henry S. Washburn, Plainville Casting Co., Plainville, Conn., a coffee talk by L. P. Robinson, Werner G. Smith Co., Cleveland, and a film "Iron Men of New England," produced by Mystic Iron Works and New England Coke Co. The New England Conference is spon-

sored jointly by the American Foundrymen's Association, New England Foundrymen's Association and Massachusetts Institute of Technology.

East Lansing Conference

The annual regional conference sponsored by the Detroit chapter, A.F.A., and Michigan State College, will be held this year on April 12 and 13 at East Lansing, Mich. The tentative program announced for this meeting includes the following papers: "Development in Melting of Gray Iron," by D. J. Reese, International Nickel Co.; "Recent Advancements in Non-Ferrous Melting," by G. K. Eggleston, Detroit Lubricator Co.; "Methods and Objectives in Modern Steel Melting," by C. E. Sims, Battelle Memorial Institute, Columbus, Ohio; "Melting Requirements for Pearlitic Malleable," by Carl F. Joseph, Saginaw Malleable Division, General Motors Corp.; "Solidification of Cast Iron," by Dr. R. Schneidewind, University of Michigan; "Factors Affecting Shrinkage in Foundry Metals," by H. L. Wemockel and C. C. Sigerfees, Metallurgical Department, Michigan State College; "Mechanical Properties of Castings as Affected by Mold Material," by Harry Dietert, H. W. Dietert Co., Detroit; and "Effect of Mold Materials on the Physical Properties of Cast Aluminum," by H. Gould, Aluminum Co. of America.

Rutgers Conference

On March 30, the Philadelphia and Metropolitan New York-New Jersey chapters, A.F.A., and the department of mechanical engineering, Rutgers University, will hold their second annual regional conference at New Brunswick, N. J.

There will be two technical sessions at this meeting—one on melting practice and one covering testing and inspecting castings. John Howe Hall, Philadelphia, will discuss steel practice at the melting session, D. J. Reese, International Nickel Co., New York, will speak on gray iron, while H. Gieseke of Ajax Electric Furnace Corp., Philadelphia, will cover non-ferrous melting.

At the second session Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., will speak on testing and inspecting from a producer's viewpoint, and Dr. E. N. Woldman, Eclipse Aviation Corp., Bendix, N. J., will discuss the consumer's viewpoint.

Dr. Robert C. Clothier, president, Rutgers University, will be the principal speaker at a banquet at the Roger-Smith Hotel, New Brunswick, N. J., which will climax the one-day meeting.

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STEEL TEE SLOT INSERTS (Patented)

Table Tee Slots are fitted with steel inserts so that lower edges will not be damaged by bolt heads. This construction prevents pulling out of tee slots insuring perfect condition of table throughout life of machine.

DOUBLE BRONZE NUTS

Used on all down feed and cross feed screws in all saddles and slides. This construction provides double life for all screw movements as all thrust and wear is taken by two nuts instead of one.

EXTENDED SADDLE AND HARP

To provide extra support for the slides along with an additional long-leverage bolt circle producing maximum rigidity between saddle and harp.

Examine the Hypro Openside Planer critically. Full particulars in our new Bulletin No. 110 sent free on written request.

PLANERS • PLANER MILLERS • BORING MILLS

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CINCINNATI, OHIO

Financial Notes

Allis-Chalmers Mfg. Co., Milwaukee, reports a net profit for 1939 of \$3,719,546 as against a profit in 1938 of \$2,553,946. Unfilled orders at the end of 1939 amounted to \$19,730,594 as compared with \$10,411,411 at the end of 1938. The number of employees at the close of 1939 was 14,456 as compared with 11,511 at the end of 1938.

Emerson Electric Mfg. Co. has decided to continue operations in its present plants in St. Louis and build an additional plant on a recently acquired tract at the outskirts of that city.

Chicago Pneumatic Tool Co. reports net income for 1939 of \$823,587 as against \$769,554 in 1938.

Standard Steel Spring Co., for 1939, reports net profit of \$363,884, equal to \$1.66 per share, compared with \$86,046, or 41c. a share in 1938. R. C. Enos, president, reported the company entered 1940 with a larger volume of universal joint business than a year ago and with the same customers in the spring and bumper division that it had in the last six months of 1939.

Koppers Co., Pittsburgh, and wholly-owned subsidiaries report consolidated net income of \$1,935,591, equal to \$9.68 a share on preferred stock for the year 1939. This compares with a profit of \$1,159,805 for 1938, equal to \$5.80 a preferred share.

Pittsburgh Screw & Bolt Co. reports for 1939 a net profit of \$533,766, compared with a net loss of \$350,948 in 1938. According to Charles R. Ferguson, chairman, and John P. Hoelzel, president, dollar value of sales for 1939 increased 67 per cent over 1938. Sale of the company's propeller blade division to Curtiss Wright Corp. last November enabled the company to liquidate its entire funded indebtedness.

Trade Notes

Benedict-Miller, Inc., 216-218 Clifford Street, Newark, N. J., has been incorporated as a distributor of fine steels, representing in northern New Jersey Vanadium-Alloys Steel Co., and its affiliates, Colonial Steel Co. and Anchor Drawn Steel Co. President of the company, which has already begun operations, is Purdy F. Benedict, for 22 years vice-president and director of sales for Faltoute Iron & Steel Co., Newark. Harvey L. Miller, also with Faltoute for many years, is treasurer.

The Faigle Tool & Die Corp., Detroit, staged an open house celebration March 2 when it began operations in a new shop on Chase Road and Henn Street, Dearborn, Mich. The building is 70 x 180 ft., of three-bay, monitor construction and costs approximately \$30,000. It is equipped with two five-ton Northern cranes, hand hoists for handling work in process, and has been newly furnished with machine tools.

Atlantic Abrasive Corp., 512 Pearl, South Braintree, Mass., a newly formed organization, will specialize in manufacturing wheels for grinding high speed tool steels, soft alloys, rubber and other materials which, because of rapid wear, excessive heating, or quick filling of the grinding wheels, have become problems for the executives concerned with economical production and finishing.

Link-Belt Co., Stoker Division, Chicago, announces the appointment of the Georgia Power Co., Atlanta, Ga., as retail dealers in the sale of Link-Belt stokers in that territory. The merchandising organization of the Georgia Power Company is under the direction of Mr. O. M. Jackson.

Elastic Stop Nut Corp., Elizabeth, N. J., has recently broken ground for a new plant

on Vauxhall Road, Union, N. J., a suburb of Newark. Transfer from the present plant will be made about June 1. The Austin Co., of Cleveland, is the general contractor.

Cowles Detergent Co. announces the appointment of the Apex Soap & Sanitary Corp., 1118-28 Island Avenue, McKees Rocks, Pa., as distributor of Cowles' Anhydrous Metal Cleaners in western Pennsylvania, northern West Virginia and eastern Ohio.

W. B. Lawson, Inc., dealing in industrial chemicals, oils and non-ferrous metals, with offices in the Union Commerce Building, Cleveland, has been organized by William B. Lawson. Mr. Lawson was formerly vice-president and a director of Harshaw Chemical Co., from

which he resigned the latter part of January. Previous to joining the Harshaw organization in 1930 he was with International Nickel Co. where he was director of sales.

Vita-Var Corp., paint engineers, has moved its executive and general offices to the Raymond Commerce Building, 1180 Raymond Boulevard, Newark, N. J.

Meta-Mold Aluminum Co. has moved to 95-105 Hamilton Street, Cedarburg, Wis.

Dewalt Machinery, Ltd., 1011 Harrison Street, Oakland, Cal., and 1061 Folsom Street, San Francisco, has changed its name to the Dependable Machinery Co. The company makes woodworking machinery.



- You can't have this inert film on your steel after cleaning if BRIGHT NICKEL is in the line.
- Wyandotte CSR Cleaner is giving most satisfactory results in many plants for cleaning steel stampings prior to plating with BRIGHT NICKEL. Let us tell you more about Wyandotte CSR Cleaner.
- Wyandotte Service Representatives are prepared to help you . . . not only with carbon smut removal, but also any other cleaning problems that may pop up. No job is too big, none is too small.



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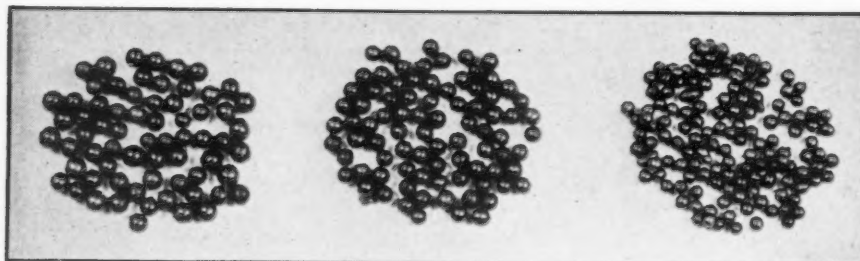
QUALITY? Our laboratories select materials specially for your products. Heat treating is under strict metallurgical supervision.

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DIVISION OF ASSOCIATED SPRING CORPORATION
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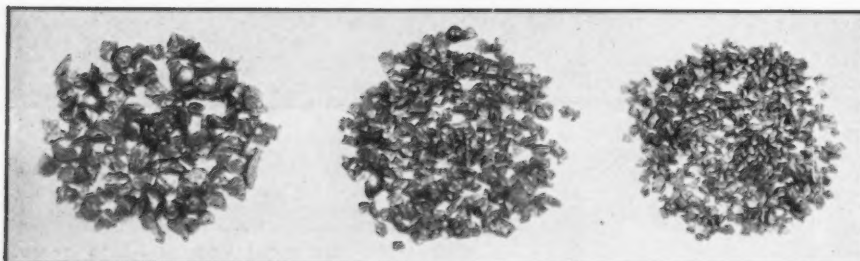
IN the period of one year we have built up a very large business with our Heat-Treated Steel Shot and Heat-Treated Steel Grit. This was accomplished on purely a quality product. Our many hundreds of customers, nationally known Concerns, are using our Shot and Grit, and sav-

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Will match any size.

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HARRISON ABRASIVE CORPORATION

MANCHESTER, NEW HAMPSHIRE



CAST IRON PIPE

Somerville, Mass., contemplates water main extensions to cost \$75,000. A loan has been authorized for project.

West Boylston, Mass., has water system improvements under consideration to cost \$462,000, and has voted \$135,000 toward project. WPA will be asked to make up difference.

Lattimore, N. C., plans pipe lines for water system and other waterworks installation, including elevated steel tank and tower. Fund of about \$87,000 is being arranged for this and sewage system. D. R. S. Frazier, Shelby, N. C., is consulting engineer.

Grand Island, Neb., plans pipe line extensions in water system in District 85, recently created.

Saukville, Wis., will hold election April 2 to approve installation of pipe lines and other equipment for water system. Cost about \$65,000. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Quartermaster, Fort Myer, Va., closes bids April 9 for 1630 ft. of 8-in. cast iron water pipe, and 304 ft. of 6-in.; also for fittings (Circular 579-15).

Rensselaer Water Co., Rensselaer, N. Y., plans pipe line extensions in water system and other waterworks installation. Cost close to \$100,000. Financing is being arranged.

Boiling Springs, N. C., has engaged D. R. S. Frazier, Shelby, N. C., consulting engineer, to prepare plans for pipe lines for water system and other waterworks installation. Fund of \$95,000 is being arranged for this and sewage system.

Gilmer, Tex., will take bids soon for pipe line extensions in water system and other waterworks installation; also for sewage system. Cost about \$46,000. Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

Newberg, Ore., plans pipe line extensions in water system and other waterworks installation. R. H. Corey, Bedell Building, Portland, is consulting engineer.

Eastside, Ore., plans pipe lines for water system and other waterworks installation, including 100,000-gal. reservoir. D. L. Buckingham, Marchfield, Ore., is consulting engineer.

Walnut Park, Cal., Mutual Water Co. will take bids April 2 on 100 tons of 6 and 8-in. pipe and valves.

Moses Lake, Wash., has taken bids on 120 tons of 4, 6 and 8-in. pipe, valves, hydrants, and fittings.

Cle Elum, Wash., has taken bids on 53,350 ft. of 4, 6, 8, 10, and 16-in. pipe, valves, hydrants, and fittings.

Glendale, Cal., will ask bids April 4 on 325 tons of 8, 12, 16, and 20-in. pipe and fittings.

... PIPE LINES ...

Sinclair-Prairie Pipe Line Co., Gulf Building, Houston, Tex., affiliated with Sinclair-Prairie Oil Co., same address, plans pipe lines for gathering system in Long Lake, Tex., oil field area. It is proposed to use 4-in. cast iron pressure pipe. Cost over \$70,000.

Superior Utilities, Inc., Amarillo, Tex., plans pipe line system for natural gas distribution at Monte Vista, Rio Grande County, Colo., where franchise has been granted, including main welded steel pipe line for connection with supply source, control station and meter house, and other operating facilities.

Lone Star-Trinity Gas Co., Crockett, Tex., plans steel pipe line in connection with new recycling plant near Grapeland, Tex., for natural gas transmission for plant requirements for processing. Line will have capacity for furnishing about 30,000,000 cu. ft. per day. Entire project will cost over \$300,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 2 for 350,000 ft. of galvanized welded steel pipe; also for welded steel pipe and plain steel pipe (Schedule 3959).

United States Engineer Office, Post Office Building, Baltimore, plans about 38,000 lb. of 3 and 4-ft. diameter steel discharge pipe in connection with five new pumping stations

on Susquehanna River, near Wilkes-Barre, Pa., for which bids are scheduled to be asked soon.

Pascagoula, Miss., has low bid at \$341,300 from Littrell Contracting Co., Carondelet Building, New Orleans, for pipe line system for municipal natural gas distribution, including main welded steel pipe line for connection with supply source, control station, etc. Bond issue of \$360,000 is available for project. F. P. Joseph, Glenmora, La., is consulting engineer.

City Councils at Flint, Bay City, Saginaw and Midland, Mich., are considering plans for joint construction of pressure pipe line from Port Sanilac on Lake Huron to Saginaw River valley area for water supply for municipalities. Proposed line will be about 72 miles long. Entire project will cost about \$9,000,000 with intake, pumping stations, reservoir and other structures.

Quartermaster, Fort Sill, Okla., closes bids April 3 for steel pipe and fittings (Circular 841-85).

Kings County Water District No. 20, near Seattle, Wash., care of Edward L. Hughes, County-City Building, Seattle, consulting engineer, plans purchase of 3-in. steel pipe for water system; also 2-in. galvanized iron. Financing is being arranged through Federal aid.

City Council, Flagstaff, Ariz., plans 12-in. pressure pipe line for main water supply from Lake Mary to municipality, about seven miles; also installation of two 700-gal. per min. diesel engine-driven pumping units, two motor-driven pumping units for lifting water into city distribution lines, water treating plant and other equipment. Cost about \$255,750. Financing is being arranged through Federal aid.

Imperial Oil Co., Ltd., Sarnia, Ont., plans welded steel pipe line extensions in main crude oil transmission system. Cost over \$100,000 with booster stations and other facilities.

Columbia Tool Steel to Build New Melting Shop

CHICAGO—Columbia Tool Steel Co., Chicago Heights, Ill., has ordered 170 tons of structural steel from Mississippi Valley Structural Steel Co., Cicero, Ill., for construction of a new melting shop. A 6-ton Pittsburgh Electromelt furnace will be installed, more than doubling the present electric steel ingot capacity of 4000 tons annually. The new shop will allow all scrap to be handled indoors. Completion is expected late in the second quarter.

Fabricated Structural Steel Orders Up 18% in February

NEW contracts for fabricated structural steel in February were 92,526 tons or 18 per cent above January while bookings for the first two months of the year were 184,431 tons, or 92.9 per cent of bookings for the corresponding months of 1939. Shipments during February totaled 91,875 tons, compared with 109,496 tons in January and with 84,412 tons in February, 1939. The American Institute of Steel Construction reports tonnage available for future fabrication at 350,310 tons.

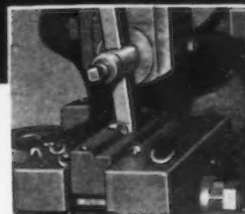
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General Offices at HOLLY, MICHIGAN
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... PERSONALS ...

JOHN A. DILLON, who until Jan. 1 last was vice-president in charge of Eastern sales of the Pittsburgh Screw & Bolt Corp., Pittsburgh, having been with that company for 20 years, has formed the Standard International Sales Corp., which will open offices April 1 in the New York Central Building, 230 Park Avenue. Mr. Dillon becomes president of the new company and NORMAN ALLDERDICE is vice-president and secretary. The new company will engage in export and domestic sales of steel and allied products. In the domestic field the company will specialize in sales to railroads, car and locomotive builders, shipbuilders and oil companies. Associated with Mr. Dillon is an organization of men experienced in export and domestic steel sales. Mr. Dillon and Mr. Alderdice will handle domestic sales.

♦ ♦ ♦

JAMES W. COREY, since 1932 general sales manager of the Reliance Electric & Engineering Co., Cleveland, has been elected vice-president in charge of sales. He started in the engineering department of the company in 1911 and was transferred to the sales department in 1916. He was made assistant sales manager in 1927 and general sales manager five years later. He has been a director of the company since 1935.

HUGH M. CORROUGH, who has been identified with the Alco Products Division of the American Locomotive Co., New York, since 1936, has been appointed manager of that division. He first served Alco Products as chief mechanical engineer, then became assistant manager of engineering and manager of engineering. He is a graduate of Iowa State College and was identified with the oil refining industry up to the time he joined Alco Products.

♦ ♦ ♦

C. N. KIRKPATRICK, formerly vice-president in charge of sales of the Landis Machine Co., Waynesboro, Pa., has been elected vice-president and general manager.

J. H. ELLIOTT, purchasing agent of the company, has been elected secretary to succeed Mr. Kirkpatrick. Mr. Elliott continues as purchasing agent.

♦ ♦ ♦

J. I. ONARHEIM, sales engineer for the Allis-Chalmers Mfg. Co., Milwaukee, has been appointed manager of the firm's Chattanooga district office, to succeed D. S. KERR, who takes charge of the Atlanta district office. Mr. Onarheim joined Allis-Chalmers in 1920 after service with the army during the World War in France and was connected with the electrical department in transformer design, de-

velopment of insulating material and voltage regulators until 1935 when he was made sales engineer in the transformer division. Mr. Kerr has been identified with the Allis-Chalmers company since his graduation from Purdue University in 1922.

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EDWARD P. CONNELL, treasurer, has been named to the newly-created position of general manager of the Falk Corp., Milwaukee, and WALTER L. SCHNEIDER, sales engineer and assistant sales manager, has been appointed sales manager in charge of all Falk products except those covered by the foundry division. MATTHEW A. CARPENTER, former sales manager, who is secretary of the company, will continue in a supervisory capacity over sales, sales promotion and advertising. Mr. Connell went with Falk in 1913 from the Lake Shore Engineering Works as order clerk and accountant. In 1917 he was made purchasing agent, in 1924, controller and in 1939 was elected treasurer. Mr. Schneider joined the company in 1920 as an engineer and later was advanced to sales engineer and later as assistant sales manager. Both Connell and Schneider are active in the work of the American Gear Manufacturers Association.

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G. A. SMITH has been named assistant general manager of the Detroit Transmission division (hydramatic transmission) of General Motors Corp., at Detroit. Formerly he was



JOHN A. DILLON, president of Standard International Sales Corp.



JAMES W. COREY, new vice-president in charge of sales of the Reliance Electric & Engineering Co.



HUGH M. CORROUGH, manager of Alco Products Division, American Locomotive Co.

assistant plant manager of the Meriden, Conn., factory of the New Departure division.

♦ ♦ ♦

DAVID T. MARVEL has been made assistant manager of Sales, Ellwood City, Pa., sales division of National Tube Co., Pittsburgh. He formerly was manager of tube sales for Timken steel and tube division of Timken Roller Bearing Co., Canton, Ohio.

♦ ♦ ♦

E. C. BRODE has been named merchandise manager for the central district of the Westinghouse Electric Supply Co., with headquarters in Detroit, it has been announced. He will be in charge of operations in Ohio and Michigan.

♦ ♦ ♦

HERBERT CONWAY has been named assistant works manager of Allison Engineering division of General Motors Corp. at Indianapolis, leaving the post of master mechanic at the plant of Pontiac Motor division. HOWARD PHELPS, formerly Mr. Conway's assistant, has been named master mechanic at Pontiac.

♦ ♦ ♦

H. P. LADDS, president, National Screw & Mfg. Co., Cleveland, has announced the appointment of F. C. TROESCHER as superintendent; H. G. WESTBROOK, assistant superintendent, and R. G. BURNHAM, purchasing agent. Mr. Troeschler is a veteran with the company, having joined the organization in 1894.

♦ ♦ ♦

FRANK RISING, former labor and management editor of *Business Week*, has been named general manager of the Automotive Parts and Equipment Manufacturers Association, according to C. C. CARLTON, president. He will replace CLARENCE O. SKINNER, who has resigned.

♦ ♦ ♦

HARRY EWALD, formerly sales manager of the range division of Landers, Frary & Clark, New Britain, Conn., has joined the regular staff of the Porcelain Enamel Institute, Chicago, as director of merchandising. He will head up a comprehensive service activity among manufacturers, distributors and dealers of refrigerators, ranges, heaters, washers, ironers and other appliances to assist with the promotion of porcelain enamel as a finish.

♦ ♦ ♦

JOSEPH KAYE WOOD, chief engineer, General Spring Corp., New York, delivered a lecture on "High-Temperature Pipe Suspension" at the United States Naval Academy, Annapolis,

March 14, and addressed officers and civilian engineers of the Bureau of Engineering, Navy Department, the Maritime Commission, and the U. S. Coast Guard, on the same subject, at the Army and Navy Club, Washington, March 15.

♦ ♦ ♦

JEROME STRAUSS, vice-president of the Vanadium Corp. of America, New York, addressed the Milwaukee chap-

JOHN T. WHITING, president of the Alan Wood Steel Co., Conshohocken, Pa., has been elected a director of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., succeeding the late S.M.D. Clapper.

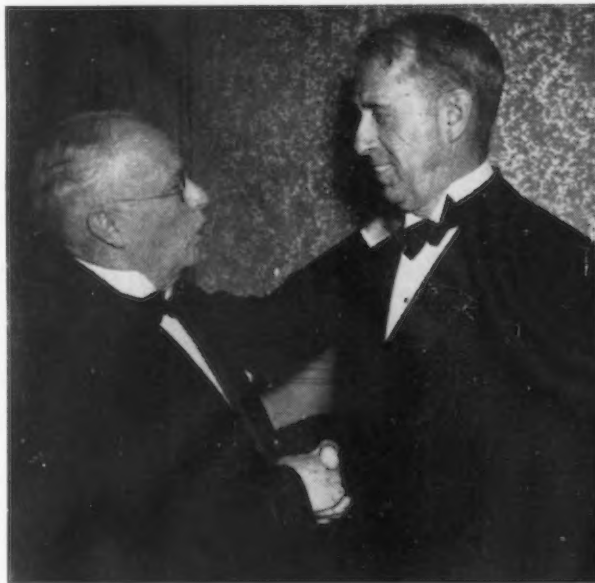
♦ ♦ ♦

EDGAR C. THOMAS, sales engineer for the Thomas Machine Mfg. Co., Pittsburgh, has established an Eastern district sales office for that company

o o o

JAMES T. PARDEE, co-founder and chairman of the board of the Dow Chemical Co. (left), and W. J. Austin, president of the Austin Co. (right), who were awarded honorary degrees by Case School of Applied Science at its 60th anniversary Founders' Day convocation on March 14. Mr. Pardee was granted the degree of Doctor of Commercial Science, and Mr. Austin, Doctor of Engineering.

o o o



ter of the American Society for Metals at a meeting in the Milwaukee Athletic Club on the subject of "Metallurgical Applications for Vanadium."

♦ ♦ ♦

WILLIAM J. BOYER has accepted a position as research chemist with the Rustless Iron & Steel Corp., Baltimore, Md., having resigned from his previous position as assistant chief chemist with the Carpenter Steel Co., Reading, Pa., where he had also been acting as an instructor for Pennsylvania State College in an extension course in ferrous metallurgy.

♦ ♦ ♦

LEO HARNER, heretofore identified with the Porcelain Enamel & Mfg. Co., Baltimore, has been appointed to act as service engineer in the California territory of the company.

♦ ♦ ♦

A. R. NIEMOELLER has been appointed sales and service representative in the St. Louis territory, with offices at 5817 Itaska Street, by the Janette Mfg. Co., Chicago.

at 1258-W, Commercial Trust Building, Philadelphia.

♦ ♦ ♦

ROBERT BURGESS, general factory superintendent of Peninsular Metal Products Corp., Detroit, has been elected a director and second vice-president of the company.

♦ ♦ ♦

A. C. ANDERSON, supervisor of machine building at the Gisholt Machine Co. observed 50 years of continuous service with the Gisholt firm March 12. He started as a lad of 16 and has supervised the building of some 12,000 lathes at the company. Mr. Anderson is now 66. For the past few weeks he has been confined to his home with illness, but expects to return to work within a short time.

♦ ♦ ♦

F. B. CORNELL and C. H. KNAPPENBERGER have been appointed agents in Michigan for the Duraloy Co., Scottsdale, Pa. The new agency will be known as the Duraloy Co. of Detroit, with offices at 1124 Ford Building, Detroit.

... OBITUARY ...

R. E. CLINGAN, Chicago district sales manager, Jones & Lamson Machine Co., Springfield, Vt., died March 11 in St. Petersburg, Fla. He was 60 years old.

Mr. Clingan was born April 10, 1879, in New Haven, Conn., where he received his education and early training in engineering and machine shop practice. At the age of 19 he became associated with the F. B. Shuster Co., New Haven, working for a number of years in the manufacturing and engineering departments. In 1908 he joined the Hess-Bright Co. (now SKF) in Philadelphia, remaining until 1919 when he went with the Bock Bearing Co., Toledo, as vice-president and general manager. The year following he was made president and remained in that capacity until the company was sold to the Timken Roller Bearing Co. in 1927.

At that time he joined the Timken Roller Bearing Co., Canton, Ohio, in an executive capacity and after remaining there until 1928 became associated with the New Departure Co., Bristol, Conn., in charge of industrial sales. He resigned this position in 1934 due to illness and after six months' rest, joined the Jones & Lamson Machine Co. as Chicago district sales manager.

He was a member of the Society of Automotive Engineers, Army Ordnance Association, Olympic Fields Country Club, Chicago, and the Detroit Athletic Club. In spite of a busy career, Mr. Clingan was always an active worker in community, social and business affairs. His loss will be felt not only by the Jones & Lamson Company, but by his many friends in the machine tool, automotive and the other industries in which he was closely associated for many years.

♦ ♦ ♦

J. ROSS BATES, for the past nine years New York district sales manager for the Shaw-Box Crane & Hoist division of Manning, Maxwell & Moore, Inc., Muskegon, Mich., died in Cranford, N. J., after a short illness on March 12, aged 60 years. He was graduated from Massachusetts Institute of Technology in 1903 and two years later became associated with Wonham & Magoe, engineers in New York. Later he helped found the firm of Wonham, Bates & Good, commercial and exporting engineers.

♦ ♦ ♦

EDWARD R. GUYER, vice-president, Cribben & Sexton Co., Chicago, stove

manufacturers, died last week from injuries suffered in a fall, aged 48 years. Mr. Guyer was a director of the American Gas Association, and former president of the Association of Gas Appliances and Equipment Manufacturers.

♦ ♦ ♦

HERMAN A. WAGNER, retired president of the Wisconsin Bridge & Iron Co., Milwaukee, died at his home in that city on March 19, aged 81 years. Mr. Wagner entered the employ of the bridge company when he was 21 years old, advancing to general manager and president. Under Mr. Wagner's leadership, the Wisconsin Bridge & Iron Co. was one of the first to voluntarily provide Saturday half holidays, vacations with pay, profit-sharing plans and injury compensation benefits for its employees. Mr. Wagner was an executive director of the National Erectors Association and a member of the American Institute of Steel Construction.

♦ ♦ ♦

GEORGE E. HAMMANN, president and treasurer of the Progressive Mfg. Co., Torrington, Conn., died after a long illness at the Charlotte Hungerford Hospital in that city on March 18, aged 73 years. He was also a former director of the Connecticut Manufacturers Association. He first went to Torrington in 1899 as export manager of the Eagle Bicycle Co. and when



R. E. CLINGAN, the late Chicago district sales manager of the Jones & Lamson Machine Co.

the firm was liquidated five years later to become a part of the Progressive Mfg. Co., Mr. Hammann was made secretary and treasurer. He was named president and treasurer and general manager in 1936.

♦ ♦ ♦

LLOYD E. SHIRLEY, vice-president and general manager of the C. S. Bell Co., Hillsboro, Ohio, died in that city on March 12, aged 60 years. Mr. Shirley's first executive position in manufacturing was as assistant superintendent of the old Link-Belt Machinery Co. at Chicago. Later he was superintendent of the Standard Scale & Foundry Co. and of the Hoosier division of International Seeding Machine Co.

♦ ♦ ♦

ALBERT E. DWYER, purchasing agent of the Peninsular Stove Co., Detroit, for 29 years, died March 20 after an illness of several months.

♦ ♦ ♦

WALTON H. MCGEAN, secretary of Pioneer Steamship Co., Cleveland, and a partner of Hutchinson & Co., vessel operating firm, died March 19 at Cleveland, at the age of 62. During the World War he headed a committee which mobilized and allocated the Great Lakes fleet under Federal supervision. Survivors include a brother, John McGean, president of McGean Chemical Co.

♦ ♦ ♦

JACOB SCHEFRIN, 74, president of the R. E. Locher & Scheffrin Co., smelter, of which he was co-founder in Milwaukee 35 years ago, died at his home in Milwaukee, March 17, following a heart attack. Survivors include a son, Samuel, secretary of the smelting firm. He was active in local Jewish circles.

All-Welded Building Will be Inspected

AN inspection trip to the Union Airlines Terminal, Forty-second Street and Park Avenue, New York, has been arranged by the New York section of the American Welding Society, for Saturday, March 30, 11 a.m.

This building is the largest all-welded unit erected in New York City to date and will be devoted to air transportation. A total of 1365 tons of steel was employed. Many special requirements and facilities necessitated employment of unusual structural details.

Warner & Swasey Co. to Enlarge Its Plant

CLEVELAND—Warner & Swasey Co. will undertake a plant addition of approximately 30,000 sq. ft., which will add 15 per cent to the present capacity for the manufacture of turret lathes. The addition will consist of a western extension of the rear of the company's present plant on Carnegie Avenue near East 55th Street.

"This addition is being constructed in order to help meet today's emergency demand for turret lathes," Charles J. Stilwell, president of Warner & Swasey, said.

"On top of a rising domestic demand from normal peace-time industries and heavy buying of machine tools for export to the Allies, there has developed an unprecedented immediate demand for turret lathes for the country's aircraft engine manufacturers, due chiefly to the war requirements of England and France and the defense requirements of the United States.

"While we are fully aware of what experience has shown to be the usual aftermath of expansion for war production, nevertheless we are convinced that the current situation calls for more than normal measures for the

speeding up of our turret lathe output, in order to cooperate in the carrying out of the program of the country's aircraft builders and the Government. There is also to be considered the fact that today machine tool capacity has a vital bearing upon the nation's position with respect to national defense.

"Since last September the capacity of our present plant has been increased by one-third, through the installation of new equipment and a three-shift operating schedule. The new addition will represent a 15 per cent increase over today's capacity.

"The company is continuing its present price policy. No increases in our base prices have been made since April 15, 1939."

Contract for the erection of the addition is expected to be awarded in the comparatively near future.

Demand Increasing for Refrigerating Equipment

WAUKESHA, WIS.—Waukesha Motor Co. reports expansion in its refrigerating equipment for air conditioning division due to demand by truck transportation firms, bus lines and railroads. Current production is being centered on a special unit for the Greyhound Corp. which will run

into more than 1000, about half for new buses under construction and the remainder for existing types. Waukesha officials predict Greyhound will have more than 1200 of its buses air conditioned by the middle of this year. New railroad passenger equipment accounts for many of Waukesha's units.

Graham, of J. & L., to Discuss Bessemer Metallurgy

PITTSBURGH — Metallurgical problems of the bessemer process of steel making will be discussed here next Tuesday, April 2, by H. W. Graham, director of metallurgy and research, Jones & Laughlin Steel Corp., at a joint meeting of the Pittsburgh section of the American Institute of Mining and Metallurgical Engineers, the A.I.M.M.E. bessemer steel committee, and the steel works section of the Engineers Society of Western Pennsylvania. The meeting will be held at 8 p. m. at the Hotel William Penn. J. B. Carlock, vice-chairman, A.I.M.M.E., will preside.

Omaha Steel Warehouse Announces New Prices

Omaha, Neb.—Gate City Iron Works has announced Omaha warehouse base prices on all hot rolled and galvanized items amounting to 50c. per 100 lb. above Chicago base prices. These will mean lower prices to steel buyers in Nebraska and some western Iowa points than the former method of pricing on the Chicago base plus l.c.l. freight to destination.

The new prices are:

Base Prices, f.o.b. Omaha, in quantities 400 to 1999 lb., complete order

	Per 100 lb.
Bars, hot rolled, rounds, flats and angles	\$3.90
Bars, square, and other bar shapes	4.05
Hot rolled strip	4.00
Structural shapes	3.95
Stair stringer channels	4.75
Plates	3.95
Floor plate	5.55
Hot rolled sheets	3.75
Subject to quantity extras and deductions	
Galvanized sheets, 500 to 1499 lb., base	\$5.00
Subject to quantity extras and deductions	

Railroad Steel Purchases Gain in 1939

WASHINGTON — Purchases of iron and steel products by Class 1 railroads in 1939 amounted to \$273,968,000, compared with \$152,176,000 in 1938 or an increase of \$121,792,000, according to J. J. Pelley, president, the Association of American Railroads.

Total purchases for fuel, material and supplies last year aggregated \$769,314,000, an increase of \$186,032,000 above 1938, but a decrease of \$197,069,000 below 1937. Details on purchases of iron and steel products follow:

	1939	1938
Steel rail (new and second hand, except scrap)	\$38,339,000	\$23,742,000
Wheels, axles and tires	25,799,000	16,691,000
Frogs, switches and crossings and parts	9,015,000	4,769,000
Track fastenings, track bolts, spikes, etc.	34,736,000	16,347,000
Bridges, turntables and structural steel	2,523,000	2,451,000
Bar iron and steel, spring steel, tool steel, unfabricated rolled shapes, wire netting and chain, except light coil: boiler, firebox, tank and sheet iron and steel	21,963,000	7,910,000
Forgings and pressed steel parts for locomotives	2,953,000	2,045,000
Car forgings, iron and steel, and fabricated or shaped steel, for passenger and freight cars	13,030,000	4,221,000
Flues and tubes for locomotives and stationary boilers	4,541,000	2,213,000
Interlocking and signal material	12,089,000	7,484,000
Telegraph, telephone and radio material	1,767,000	1,052,000
Bolts, nuts, washers, rivets, lag screws, pins and studs	9,412,000	3,961,000
Springs for locomotives and cars	2,996,000	1,612,000
Locomotive and car castings, beams, couplers, frames and car roofs	39,587,000	22,221,000
Track and roadway tools, miscellaneous track material and wire fencing. Motor, hand, push and velocipede cars and parts	5,925,000	3,769,000
Machinery and repair parts, including all power driven shop machinery	2,803,000	2,303,000
Machinery, boilers, repair parts and all other iron and steel products	7,215,000	4,899,000
Pipe, iron and steel and fittings	5,387,000	2,559,000
Hardware	3,933,000	2,314,000
Hand and small machine tools, such as drills, taps, reamers, dies, chasers, including air tools and parts	6,181,000	3,114,000
Air brake material	8,611,000	6,599,000
Standard and special mechanical appliances for locomotives	10,443,000	6,447,000
Automotive equipment and supplies	4,720,000	3,453,000

Bethlehem Mill Relocated

BETHLEHEM STEEL CO. will erect five new buildings and will move the 12-in. bar mill at the Lackawanna plant, Buffalo, to a site near the company's strip mill as part of a plan to streamline production at this plant. The new mill sheds will cover approximately nine acres.

U. S. Steel Corp.'s Exports 9% Of Its Total Sales Last Year

EXPORT sales of U. S. Steel Corp. in 1939 accounted for nine per cent of total sales, the corporation's annual financial report, made public this week, reveals. The report also showed ingot output for the year of 17,625,676 net tons, or 61 per cent of capacity, representing an increase of 67 per cent over 1938. Output of pig iron, spiegeleisen and ferromanganese was 13,655,719 net tons, a gain of 79 per cent, and iron ore production was 24,109,887 tons, an increase of 98 per cent. Production of rolled and finished steel for sale was 11,996,811 net tons, a gain of 66 per cent over the previous year's total and equal to 60.7 per cent of finishing capacity.

Taxes in 1939, which "have become a serious factor in the production and marketing problems of the corporation," amounted to \$67,000,000 or about \$1,288,000 per week.

Gross sales in 1939 were \$801,039,242, as compared with \$560,508,303 in 1938, and net income available for preferred dividends was \$41,119,934 in the past year, as against a deficit of \$7,717,454 in 1939. Assets at the close of the year amounted to \$1,768,523,663, an increase of \$57,244,657 over the 1938 figure. Inventories at the end of the past year were valued at \$294,593,046 as compared with \$279,518,604 in the previous year.

Available capacities in 1939, on a net ton basis, were reported as follows: blast furnaces, 22,957,000; steel ingots and castings, 28,885,000, and rolled and finished products, 19,759,000.

The 1939 report represents a departure from past presentations in that the usual forms and phrases of accounting are completely lacking and the data are all broken down into

simple, non-technical language, with most of the pertinent operating facts presented on a per employee basis.

Reviewing the year's experience, Edward R. Stettinius, Jr., chairman of the board, said:

"The higher level of operations which prevailed during the year resulted in larger earnings, although not in proportion to those of 1936, a year of comparable tonnage. The lower relative earnings in 1939 were due to a number of factors, an important one being that a considerable part of the total tonnage consisted of products yielding lower prices. The increased tonnage failed to reduce unit cost sufficiently to offset the influence of the lower price yield. The earnings available for payment of interest and dividends, although a decided improvement over the previous year's results, do not represent from any viewpoint an adequate return upon investment; nor were the 1939 earnings sufficient to offset the 1938 deficit after payment of preferred dividends."

Allies Will Get Latest War Planes

STEPS in the direction of lifting restrictions on the sale of the latest model war planes to the French and British are rapidly bringing the long heralded billion dollar purchase of airplanes by the Allies to a head. It is reported that the War Department has agreed to relax restrictions on the sale of late model planes being built for the national defense program to permit the Allies to obtain immediately 500 to 600 of the latest and fastest models now in production. This change in policy was reported to have been agreed upon Monday at a conference of President Roosevelt, Harry H. Woodring, Secretary of War, and Gen. George C. Marshall, Army Chief of Staff.

Washington Engineers Hear Structural Welding Lectures

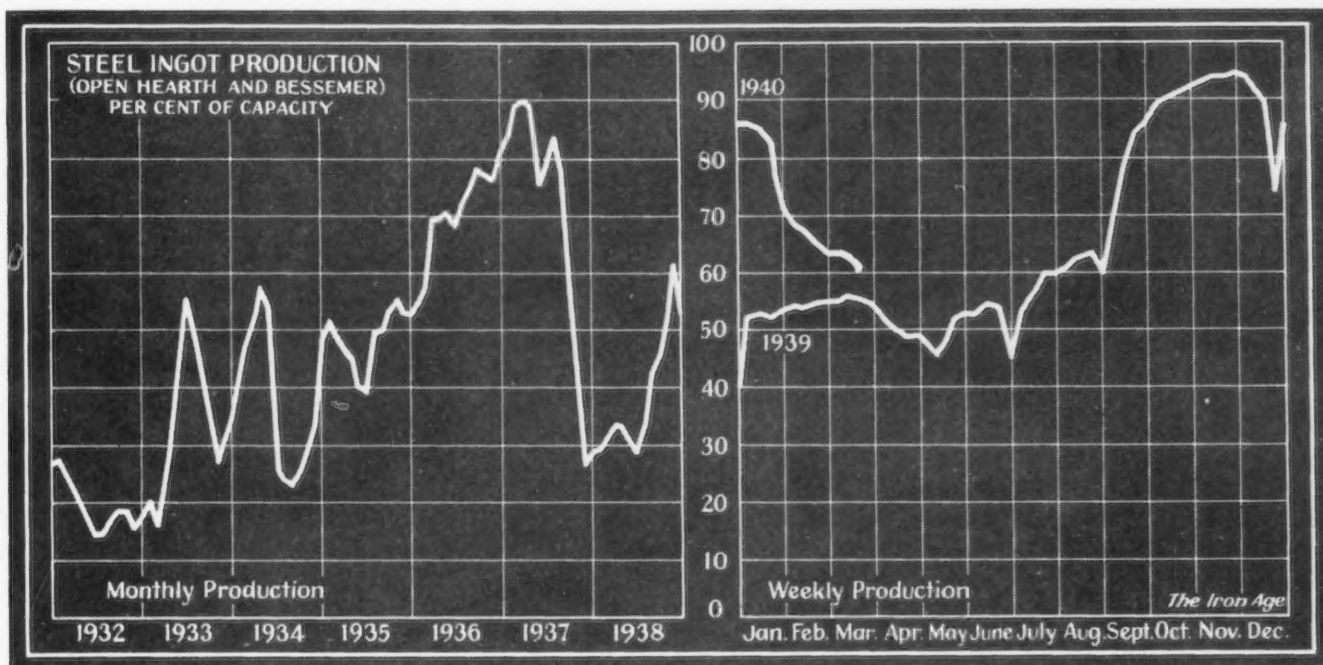
THE seventh in the series of educational lectures sponsored by the Washington section of the American Welding Society will be held April 4. The subject will be "Qualifications of Welders and Inspection of Welds" and the speaker, R. W. Clark, research engineer, General Electric Co. A meeting on the evening of April 11 will feature a motion picture showing "The Making and Shaping of Steel."

Nation's Largest Bridge Girder Goes Into Jersey Bridge

FIVE freight cars were required to move this 200-ton girder from the fabricating plant of the Bethlehem Steel Co. at Pottstown, Pa., to the site of the Thomas A. Edison bridge over the Raritan river, near Perth Amboy, N. J. This massive steel rib measures 260 ft. in length and 21 ft. in depth and had to be lifted 130 ft. from the ground level to the pier tops. Two such girders were recently put into place in the bridge. These girders are said to be the longest and biggest ever put into a bridge in the United States and engineering records indicate that they are the largest pieces of fabricated steel ever hoisted by derricks on a construction job. The bridge was designed by Morris Goodkind, engineer of bridges, New Jersey State Highway Department, and is being erected by Bethlehem Steel Co. About 9500 tons of steel will be required.



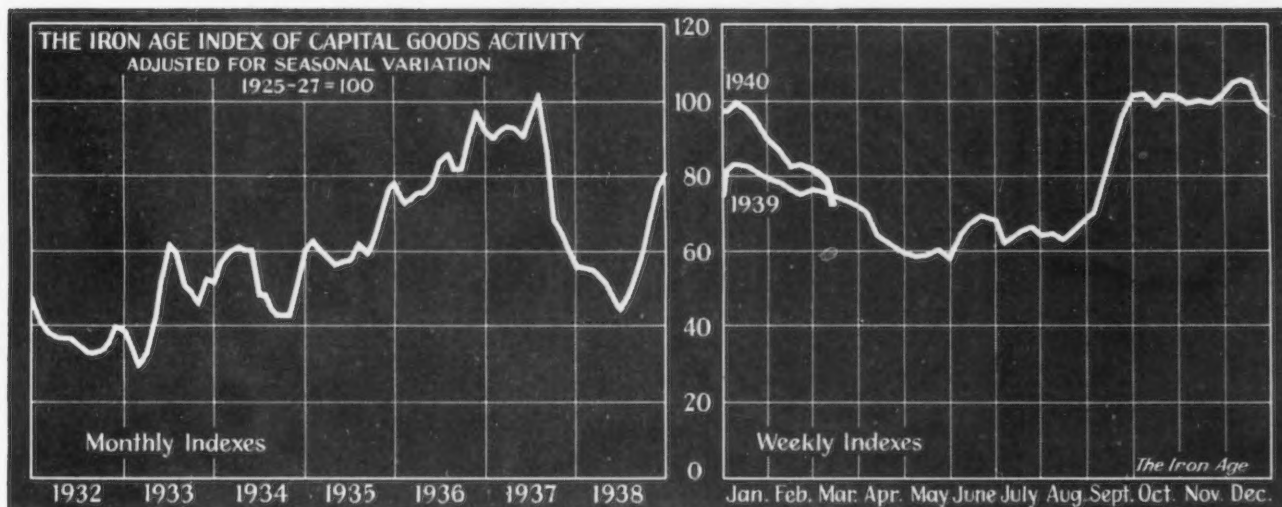
Ingot Rate Drops One and One-Half Points to 61% of Capacity



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
CURRENT WEEK..	58.0	56.5	46.0	63.0	66.0	51.5	59.0	80.0	78.0	51.0	70.0	40.0	90.0	61.0
PREVIOUS WEEK..	58.0	59.5	44.0	63.0	70.0	51.5	68.0	82.5	78.0	55.0*	70.0	58.5	90.0	62.5

*Corrected.

Further Decline Registered by Capital Goods Index



A FURTHER loss was registered in the past week by the index of capital goods activity compiled by THE IRON AGE. The combined index for the week ended March 23 was 75.5, down 2.4 points from the previous week and almost 25 per cent below the present year's high of 100 recorded in the second week of the January. With the exception of the volume of heavy construction awards, physical output of the industries represented in the index was off slightly from the preceding week. These losses were considerably magnified when adjusted against the rising seasonal factors. The week's gain in dollar value of construction awards was due primarily to publicly financed projects, but private activity also showed a small increase. The week's increase in awards, however, was

less than the seasonal requirement and the adjusted index for this component was off 0.1 point for the week.

	Week Ended Mar. 23	Week Ended Mar. 16	Comparable Week	
			1939	1929
Steel ingot production ¹	80.5	81.7	71.3	119.2
Automobile production ²	95.2	100.4	82.3	127.2
Construction contracts ³	60.0	60.1	91.4	142.4
Forest products carloadings ⁴	56.3	57.6	47.5	119.2
Production and shipments, Pittsburgh District ⁵	85.4	89.9	73.4	116.5
Combined index	75.5	77.9	73.2	124.9

Sources: ¹ THE IRON AGE; ² Ward's Automotive Reports; ³ Engineering News-Record; ⁴ Association of American Railroads; ⁵ University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ending March 16. Other indexes cover the week of March 23.

... SUMMARY OF THE WEEK ...

... *New business not sufficient to arrest production decline.*

... *High rate of export activity in contrast with domestic dullness.*

... *Low temperatures and snow have delayed seasonal expansion in some lines.*

NEW steel business, while improving slightly in some products, has failed to develop in sufficient aggregate volume to arrest the decline in production, which has continued almost without interruption from the high point of last November.

March, traditionally one of the most active months for the steel industry, has failed this year to live up to earlier expectations of seasonal expansion of importance. Bookings of a major steel company in March have fallen below those of February, and, while some other companies have had gains of 10 or 15 per cent in aggregate tonnage, the comparison loses significance from the fact that February bookings were generally poor.

In only five of the 20 years previous to 1940 has March steel production failed to gain over that of the preceding February, and of these three occurred in such periods of marked depression as 1921, 1932 and 1933. Not infrequently March and October have been peak months in production in steel history.

There is, moreover, still no indication of a broad upward movement within the immediate future, though at the same time there may be said to be reasonable hopes for a belated seasonal expansion of moderate proportions, possibly sufficient to check the production decline at not much below its current rate, which is estimated at 61 per cent for this week, a point and a half below last week's average.

What the steel industry needs and what it lacks at the moment as a basis for second quarter calculations is a definite idea of probable requirements in some of the capital goods lines, notably building construction and railroad equipment. A structural steel fabricating company whose business is national in scope reports that the total tonnage being figured for construction projects has declined to about one-third the January volume. In the railroad equipment field there is an expectation that 50,000 or more freight cars may be purchased this year, but action probably will be delayed for some months pending determination of the future trend of carloadings. The Pittsburgh & Lake Erie (New York Central Lines) has ordered 1000 freight cars divided equally between the Pullman-Standard Car Mfg. Co. and the Pressed Steel Car Co.

THE automobile industry is continuing a high and steady rate of production, but its purchases of steel over the remainder of the 1940 model produc-

tion period will be mainly in small lots to round out inventories as a precaution against left-over materials and parts when the industry swings into production of 1941 models. Small purchases of steel for die tryouts on new models have been made. The largest automotive purchases of the past week were made by Ford Motor Co., which authorized specification of steel for 50,000 cars, but much of this will be furnished by its own mills, outside purchases probably not exceeding 20,000 tons. A minor tonnage was placed by the reorganized Reo Motors, Inc., which is planning to get into production soon. Meanwhile, retail sales of motor cars are continuing in encouragingly high volume.

Can manufacturers are producing at a higher rate than they were a year ago and are planning for huge food packs this year. Seemingly this is not indicated by the current rate of tin plate production, estimated at 59 per cent, up three points, but the fact is that cold reduction mills are running at practically full capacity while many hot mills, which were in use last fall, are idle. The production rate on a percentage basis is low because of large excess capacity.

Farm tractor and implement production is slowing down because of heavy stocks of finished machines. Although crop forecasts are not particularly encouraging, the industry expects a 15 per cent gain in sales this year.

Shipbuilding continues as one of the most active branches of steel consumption. Pending boats call for about 75,000 tons of steel.

Unquestionably the weather has played a part in the current steel situation. Unseasonably low temperatures and snow have delayed the starting of some outdoor activities which usually are under way at this time.

IN contrast with the comparative dullness of domestic steel business is the continued high rate of activity in exports. The bottom of the recent sharp decline in export prices may have been reached as some mills show an inclination toward firmer quotations. Plates have been the conspicuously weak item, although weakness has affected virtually all products.

Domestic prices, however, are generally firm except on reinforcing bars in which the situation is so chaotic that both buyers and sellers are unable to name quotations which are truly representative of the market.

Scrap markets reflect the uncertainty of immediate prospects. Prices on the No. 1 steel grade are lower at Chicago and Philadelphia and unchanged at Pittsburgh. THE IRON AGE scrap composite has declined 25c. to \$16.29, lowest since the first week of September, 1939.

Machine tool demand continues to expand. There is so much unsatisfied business in prospect that a Cleveland manufacturer of turret lathes has decided upon plant expansion.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleveland, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.10	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.10	2.10	2.10	2.15
Cold rolled sheets: Pittsburgh, Chicago, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	3.20

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Cents Per Lb.:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	\$5.00

Pig Iron

Per Gross Ton:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
No. 2 fdy., Philadelphia	\$24.84	\$24.84	\$24.84	\$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cln'tl	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
Heavy melting steel, P'gh...	\$16.75	\$16.75	\$17.25	\$15.875
Heavy melting steel, Phila...	16.75	17.25	17.25	15.75
Heavy melting steel, Ch'go...	15.375	15.625	15.625	14.25
Carwheels, Chicago	16.75	17.00	17.25	13.00
Carwheels, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Pittsburgh	18.25	18.25	18.25	15.50
No. 1 cast, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Ch'go (net ton)	13.25	13.50	14.25	12.75

Coke, Connellsville

Per Net Ton at Oven:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
Furnace coke, prompt	\$4.00	\$4.00	\$4.00	\$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75

Non-Ferrous Metals

Cents Per Lb. to Large Buyers:	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939
Copper, electrolytic, Conn.	11.50	11.50	11.50	11.25
Copper, lake, New York	11.50	11.50	11.50	11.375
Tin (Straits), New York	46.00	46.50	48.50	46.50
Zinc, East St. Louis	5.75	5.75	5.75	4.50
Zinc, New York	6.14	6.14	6.14	4.89
Lead, St. Louis	5.15	5.25	5.00	4.70
Lead, New York	5.00	5.10	4.85	4.85
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

The Iron Age Composite Prices

Mar. 26, 1940
One week ago
One month ago
One year ago

Finished Steel

2.261c. a Lb.	
2.261	
2.261	
2.286	
Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	

Pig Iron

\$22.61 a Gross Ton	
22.61	
22.61	
20.61	

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Steel Scrap

\$16.29 a Gross Ton	
16.54	
16.71	
15.29	

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

1940.....
1939.....
1938.....
1937.....
1936.....
1935.....
1934.....
1933.....
1932.....
1931.....
1930.....
1929.....

High	Low
2.286c., Jan. 3	2.236c., May 16
2.512c., May 17	2.211c., Oct. 18
2.512c., Mar. 9	2.249c., Jan. 4
2.249c., Dec. 28	2.016c., Mar. 10
2.062c., Oct. 1	2.066c., Jan. 8
2.118c., Apr. 24	1.945c., Jan. 2
1.953c., Oct. 3	1.792c., May 2
1.915c., Sept. 6	1.870c., Mar. 15
1.981c., Jan. 13	1.883c., Dec. 29
2.192c., Jan. 7	1.962c., Dec. 9
2.236c., May 28	2.192c., Oct. 29

High	Low
\$22.61, Sept. 19	\$20.61, Sept. 12
23.25, June 21	19.61, July 6
23.25, Mar. 9	20.25, Feb. 16
19.73, Nov. 24	18.73, Aug. 11
18.84, Nov. 5	17.83, May 14
17.90, May 1	16.90, Jan. 27
16.90, Dec. 5	13.56, Jan. 3
14.81, Jan. 5	13.56, Dec. 6
15.90, Jan. 6	14.79, Dec. 15
18.21, Jan. 7	15.90, Dec. 16
18.71, May 14	18.21, Dec. 17

High	Low
\$17.67, Jan. 2	\$16.29, Mar. 26
22.50, Oct. 3	14.08, May 16
15.00, Nov. 22	11.00, June 7
21.92, Mar. 30	12.92, Nov. 10
17.75, Dec. 21	12.67, June 9
13.42, Dec. 10	10.33, Apr. 29
13.00, Mar. 13	9.50, Sept. 25
12.25, Aug. 8	6.75, Jan. 3
8.50, Jan. 12	6.43, July 5
11.33, Jan. 6	8.50, Dec. 29
15.00, Feb. 18	11.25, Dec. 9
17.58, Jan. 29	14.08, Dec. 3

... THIS WEEK'S MARKET NEWS ...

NEW BUSINESS

... Export activity chiefly responsible for minor sales gains

BY virtue of support from export markets, aggregate specifications at CLEVELAND up to March 26 remained slightly ahead of those received in the corresponding February period. Domestic buying is indecisive, however. Apparently hand-to-mouth purchases will continue as the policy of many consumers during the early weeks of second quarter, except those who are benefited by the eventual break-up of the prolonged cold weather which has been a strong adverse factor in many sections of the United States.

Although the weather has frequently been used as an alibi for the failure of new steel business to develop in a larger volume, there have been very definite indications recently that it has been a major factor in retarding the usual spring pickup. Unseasonably cold weather in the South and Southwest during the past few months has directly affected building, both from a fabricating and concrete bar standpoint, farm repairs such as fence placing and barn repairing, oil drilling, which in turn has had its effect on oil country goods specifications, and finally, the weather has apparently had no small influence on limiting the general buying of all consumers. Many steel sales executives look for a reasonable pickup in general steel business engendered by normal seasonal factors as soon as an extended period of open weather develops.

The aggregate volume of fresh steel bookings at PITTSBURGH in the past week changed little from the week before. Domestic buying remains on a strictly hand-to-mouth basis and total weekly figures are affected somewhat by placement of export business. While no concrete evidence of a definite upward trend is yet discernible, there appears to be some expansion in the number of consumers placing orders. From a tonnage standpoint, however, total steel specifications are about on a par with a month ago, some companies registering less business, while others show an actual increase over a month ago. Export demand covering semi-finished steel, bars, and plates continues as an important factor of support.

Two CHICAGO district sales offices report that new orders for March to date have gained from 10 to 15 per cent over those of the same period last month. This increase, though small, is well diversified, and gives promise of expanding when warmer weather arrives. Other offices see little change from their experience of the past few weeks, and the incoming business for the district probably still does not exceed an average of 40 per cent of capacity. The unseasonably cold weather in the CHICAGO district is undoubtedly an important factor in the slowness with which the spring business rise is developing.

It is believed in CHICAGO that a hand-to-mouth purchasing policy will prevail in DETROIT with regard to sheets for 1940 cars. All the major companies are believed to have need of more steel for their current runs, and small buys every two weeks or so are expected. Conversations with steel producers are being held in Detroit now on 1941 programs.

An optimistic feeling is general in the trade but little or nothing is in sight for the next few weeks to give tangible support to this sentiment. Farm tractor and implement production is slowing down in some cases because of heavy stocks of finished machines, and crop forecasts are not particularly encouraging. The industry, however, expects about a 15 per cent increase in sales this year. Structural shape and plate orders are exceedingly light. Except in sheets, rails and tin plate, few mills have backlogs of importance, and further operating declines are almost sure to be seen unless new business improves immediately. At some mills the rail program will be completed in late spring.

There was a slight increase in the number of orders booked by PHILADELPHIA sellers in the past week, but the period's total tonnage was practically unchanged from the previous week. At present it appears doubtful if March bookings, on a tonnage basis, will equal those of February. Operations at consumers' plants are holding up well and it's becoming increasingly evident that steel users' inventories are growing very small. Current orders invariably call for immediate shipment. There have been numerous instances lately where the speed with which the material could be delivered was the determining factor in placing business. No action has

been taken as yet on the recent Navy plate bids on which two EASTERN PENNSYLVANIA producers were low.

Pacific Coast jobbers report business brisk and outlook bright but prices continue weak in the SAN FRANCISCO district. Although no new imports have appeared for some time, some foreign material still remains in stock and inventories are high for the most part.

Steel plate fabricators on the Coast appear to have the brightest outlook, with several fabricated projects pending and further inquiries due. Mill sales activity continues light.

PIG IRON

... New business lighter; melting rate gains at some points

NEW business is somewhat lighter in most sections but inventories are being worked down and prospects for improvement in April are not discouraging. The weather continues a hampering factor. The daily average of shipments and orders during March at CLEVELAND is little changed from February, with melting schedules irregular. Although there has been no change in volume recently at PITTSBURGH, producers there look for better buying soon.

Less business than a week ago is being booked in the New York area where, however, there are signs of improving operations for jobbing foundries. March bookings, despite the current letdown, will top January and February for some sellers in that area.

A small amount of carlot business is being booked regularly by PHILADELPHIA sellers, but most consumers are still fairly well covered by old contracts. Melting operations, particularly by stove parts makers, have shown a small seasonal gain lately. Export business continues to be hampered by lack of cargo space.

CHICAGO district shipments of pig iron and foundry coke are little changed from a week and a month ago. The foundry melt temporarily is slightly higher.

Small improvement in the district melt last week brought a slight increase in pig iron releases in SOUTHERN OHIO. Most melters have covered quietly for second quarter needs with

commitments averaging about the same as the first quarter. Machine tool foundries continue to lead the market in operations, although automotive parts and stove foundries are reported to be operating at slightly better rates.

Some NEW ENGLAND foundries that have been operating six days a week have gone or will go on a five-day schedule shortly. The aggregate New England melt may drop to around 60 to 65 per cent of capacity.

Shipments of pig iron to melters in the St. Louis territory continue to show improvement. New business consisting of a few orders of from 50 to 100 tons. Incoming business at Buffalo is fair. Foundries have not curtailed operations drastically and shipments are steady.

PRICES

... Chaotic situation exists in reinforcing bar market ... Export quotations may firm up

WHILE quotations on major steel products are firm, this stability is in marked contrast to the chaotic price situation existing in the reinforcing bar market. It is virtually impossible for either buyers or sellers of reinforcing bars to say what the current market prices are. An average price is about 1.90c. a lb. at principal basing points. Small lots bring prices slightly above this figure, but there are concessions from that level on the larger lots.

Some irregularity on galvanized sheets is reported from the South and Southwest.

A bottom may have been reached in the recent rapid decline of export prices. Plates have been the most conspicuously weak item, but the decline has affected virtually all products. Some mills are now showing an inclination to stiffen their quotations.

Electro Metallurgical Sales Corp. has reaffirmed current prices on all of its products for second quarter business.

STRUCTURAL STEEL

... Activity restricted ... Awards and inquiries light

FABRICATED structural steel lettings of 7500 tons are the lowest since the first week in June, 1938. Awards are all in small lots with no letting of more than 700 tons reported.

New structural steel projects de-

clined to 6600 tons from 8700 tons last week. The only sizable inquiry is 1200 tons for a building at the Naval Medical Center at Bethesda, Md.

Among plate awards of 6670 tons is 3000 tons for barges for the Campbell Transportation Co., Pittsburgh.

As an indication of the inactivity of this market, the total tonnage quoted upon by a large national fabricator has declined more or less steadily from the first of the year to a point where last week it was less than one-third the January figure.

Structural specifications at PITTSBURGH are improved slightly from a week ago but fabricators still find the volume of inquiries and awards somewhat below satisfactory levels, at least from a tonnage standpoint.

To be bid this week is the \$3,500,000 Rainbow Bridge at Niagara Falls, N. Y. Estimates call for about 7000 tons of shapes.

STEEL OPERATIONS

... Ingot rate for industry declines a point and a half to 61%

THE decline in steel production, which has continued almost without interruption from the high point of last November, has not yet been arrested. This week's decline is estimated at a point and a half to 61 per cent.

Among the major producing districts, only in the Ohio Valleys has there been a gain, which amounts to two points and raises the estimated rate there to 46 per cent. Rates are unchanged in the PITTSBURGH, EASTERN PENNSYLVANIA, BUFFALO and BIRMINGHAM districts, but are lower in the CHICAGO, CLEVELAND, WHEELING-WEIRTON, DETROIT and SOUTHERN OHIO districts. The CHICAGO rate has declined three points to 56½ per cent.

REINFORCING BARS

... Awards are light ... Prices soft and irregular

REINFORCING steel awards total 490 tons against 14,230 tons a week ago. The only large letting is 1400 tons for a store in Detroit for the Sanders Mfg. Co.

New reinforcing steel projects call for 5500 tons, including 1600 tons for Government hangars and terminal buildings at Gravelly Point, Va.

The concrete bar price structure remains soft and highly irregular.

MERCHANT BARS

... Minor improvement mainly due to export orders

HOT rolled bar bookings at PITTSBURGH expanded some in the past week with export business continuing to be an important factor. Domestic requirements are substantially unchanged from what they had been in the last several weeks, although there have been signs of a slight pickup in the number of actual orders.

Orders at CLEVELAND are still a little ahead of February up to the 26th of the month. Considerable support for the market will be absent, however, when the implement industry completes its buying for harvesting machinery in the near future. Cold finishers are still active.

With demand from agricultural machinery plants decreasing, bar bookings at CHICAGO are no better. Miscellaneous specifying is supporting the current low level of operations, but this rate may sink lower if additional new business is not seen soon.

RAILROAD BUYING

... New York Central orders 1000 cars for P. & L. E.

THE New York Central has ordered 1000 freight cars for its subsidiary, the Pittsburgh & Lake Erie, divided equally between the Pullman-Standard Car Mfg. Co. and the Pressed Steel Car Co.

Chesapeake & Ohio is inquiring for 100 flat cars and the Norfolk Southern is taking bids on 40 rack and 12 caboose cars. United Fruit Co. is seeking prices on four 2-8-2 type locomotives for service in South America.

Siam State railways is expected to close shortly on 500 freight cars, involving about 4000 tons of steel.

SHEETS AND STRIP

... Demand broadening slightly but is not appreciably larger

SHEET sales at PITTSBURGH continue to involve relatively small tonnages but the number of consumers specifying has, perhaps, increased from a week ago. Total volume booked is equal to or greater than the amount received in the same period a month ago. The usual spring irregularities in galvanized sheet prices are occurring in the South to the extent of \$2 or \$3 a ton. This weakness, however, is

fairly well isolated and as yet has had no repercussions in the Northern and Western areas of the country.

New business at CHICAGO is virtually unchanged from a week ago. Producers expect more sheet orders from Detroit for 1940 cars and believe this business will come in small buys every two weeks or so. This hand-to-mouth policy indicates that the automobile plants are willing to run on current models as long as they will sell, but are taking precautions to avoid a carry-over. Farm equipment plants are buying for their spring production but this tonnage is declining and probably will not rise appreciably until re-orders from dealers come in.

Specifications at CLEVELAND up to March 25 were showing small gains over February. With no apparent signs of price weakness, producers have been receiving orders and releases from consumers who held back for six or eight weeks awaiting a possible break. Small orders for die try-outs for 1941 automobile models have been received. Two CLEVELAND barrel makers ordered more heavily during the past 10 days but whether this is indicative of a trend cannot be stated at this time. Talk of large scale export buying continues.

The small gain reported in flat steel demand in SOUTHERN OHIO last week has been retained during the present week. While bookings are averaging a trifle above 50 per cent of mill capacity, ordering shows no definite trend. Galvanized demand has improved to bring it about equal to its normal proportion of bookings, but it still is unseasonably low. Automotive manufacturers are only purchasing in piecemeal to fill out needs for present models.

Lacking the few exceptional purchases of a week ago, sheet sales in the NEW YORK area this week fell off, but sellers were encouraged by a better diversification of buyers. No large tonnages are moving.

PLATES

... Some evidences of stiffening in export prices

THE bottom appears to have been reached in the downward trend of export plate prices, and some mills this week are quoting higher prices than a week ago. The general trend is in the direction of the f.a.s. price stabilizing itself at the domestic base price after having dipped considerably below that in recent weeks.

Export and Government business

continues to provide chief support for rolling schedules of EASTERN PENNSYLVANIA producers. Little railroad business remains on the books and there are no new programs of any size in the offing. Potential shipyard tonnages are quite substantial, but actual releases are slow in materializing. Domestic purchases are mainly in carlot quantities.

Plate demand at PITTSBURGH is substantially unchanged from a week ago, although export business remains an important factor. The 10 tank barges recently ordered by Campbell Transportation Co., Pittsburgh, three of which will be built by American Bridge Co. and seven by Dravo Corp., will require a total of about 3000 tons of plates and small shapes. The eight barges for the Island Creek Coal Co., Huntington, W. Va., to be built by Bethlehem Steel Co. will require about 1300 tons of plates and shapes.

The J. K. Welding Co., Brooklyn, will fabricate oil storage tanks for the Patchogue Oil Co., Patchogue, L. I., requiring about 1125 tons of steel, mostly plates.

Penstocks for the Parker Dam power plant at Earl, Cal., will take about 1000 tons of plates.

TUBULAR GOODS

... Oil country orders gain ... Standard pipe demand slightly better

A BETTER flow of oil country goods specifications to PITTSBURGH mills has been noted in the past week, primarily due to better weather conditions in the oil fields. In some cases, casing and drill pipe orders so far this month are equal to or greater than the volume booked in the similar period last month. There has likewise been improvement in standard pipe demand because of more open weather in some parts of the country.

SHIPBUILDING

... Three boats for Mississippi Shipping Co. will take 12,500 tons of steel

THE Maritime Commission has called for bids on April 9 for the construction of three combination cargo-passenger ships for the account of the Mississippi Shipping Co. The ships, to be identical to three now under construction for the same com-

pany, will require a total of 12,500 tons of steel.

WIRE PRODUCTS

... Manufacturers' wire sales gain slightly ... Merchant items slow

MARCH orders for manufacturers' wire are running approximately 10 per cent ahead of February at CLEVELAND, but the comparison is poor due to the low volume of business in the previous month.

Effective April 1, a number of changes in extras will be made, a continuation of the revisions under way for several months to bring the mill return closer to production costs. The forthcoming changes include alinement of extras of certain small sizes of spring wire.

Demand for merchant wire products continues to improve only slowly. Prolonged cold weather in many sections of the nation has delayed farm buying and it now appears that many farmers will be unable to make scheduled improvements until next fall at the earliest, due to the necessity of going immediately into the fields at the first break in the weather.

Total wire sales at PITTSBURGH have expanded some in the past week, notably in the merchant wire category. Nails have been moving faster and some improvement is expected in demand for barbed wire and fencing. While wire rod sales are about on a par with the same time a month ago, an expansion in manufacturers' wire requirements has been noted in the past week. Weather conditions have had far more effect on wire sales than was generally supposed and a week of spring weather is expected to bring out a considerable amount of merchant wire product specifications.

Unusually cold weather for late March continues to delay the demand from agricultural regions which should be seen at this time. Orders at CHICAGO sales offices are virtually unchanged from recent weeks. Plants supplying springs to the automobile industry are still working on some orders for 1940 cars but are beginning to plan now for 1941 models.

BOLTS, NUTS AND RIVETS

... Aircraft and shipbuilding are outstanding sources of business

AIRCRAFT and shipbuilding requirements are providing the best order volume for bolt, nut and rivet producers in CLEVELAND. The

development of highly special quality items for aircraft needs is particularly noteworthy. Other consuming fields show moderate improvement over one year ago, although considerably reduced from fourth quarter.

SEMI-FINISHED STEEL

... Orders a little better than a month ago

ALTHOUGH not up to the volume of the previous week, which included satisfactory export tonnages, total semi-finished specifications at PITTSBURGH in the past week were at a level exceeding the volume of bookings a month ago. Producers look for weekly sales figures to continue their sporadic up and down movement which will be influenced considerably by export placements.

TIN PLATE

... Operations rise to 59% ... Outlook good for 1940 pack

TIN plate operations this week are up three points to 59 per cent. The pick-up directly reflects a more liberal volume of releases from can makers. Some producers feel that the bottom in tin plate activity has been reached. No important changes in either operations or volume of specifications, however, is expected in the near future.

One important can manufacturer is using about 20 per cent more tin plate than at this time last year. The outlook for the 1940 food pack is considered to be exceedingly good, particularly in tomatoes.

Tin plate releases in the CHICAGO district have been coming out in improved volume in the past week. A 12-turn increase in this weeks schedule of the sheet and tin mills of a large producer there is attributed mainly to this higher tin plate activity.

REINFORCING STEEL

... Awards of 4900 tons; 5500 tons in new projects

AWARDS

ATLANTIC STATES

- 820 Tons, Kingston, Pa., Toby Creek pressure culvert, Susquehanna River flood control, to Carnegie-Illinois Steel Corp., Pittsburgh, through T. M. Flanagan, contractor.
- 300 Tons, Washington, Uline Ice Co. indoor arena, to Bethlehem Steel Co., Bethlehem, Pa., through White Construction Co., contractors.
- 300 Tons, Washington, Navy Place housing project, to Bethlehem Steel Co., Bethlehem, Pa., through Charles H. Tompkins, contractor.
- 225 Tons, New London, Conn., Bethhouse—Connecting Portico & Service Building, to Bethlehem Steel Co., Bethlehem, Pa., through Corasino Construction Co., contractor.
- 225 Tons, Willowbrook, N. Y., building No. 2, to Bethlehem Steel Co., Bethlehem, Pa., through Silverblatt & Lasker, contractors.
- 200 Tons, Pennsville, N. J., State highway work to Truscon Steel Co., New York.
- 140 Tons, New York, column spirals for Treasury Procurement Division, to Jones & Laughlin Steel Corp., Pittsburgh.
- 125 Tons, New York, contract No. 343, Delaware Aqueduct, to Bethlehem Steel Co., Bethlehem, Pa., through Reiss & Weinzier, Inc., contractor.
- 100 Tons, Passaic County, N. J., State highway work, to Truscon Steel Co., New York.

CENTRAL STATES

- 1400 Tons, Detroit, store, Sanders Mfg. Co., to Bethlehem Steel Co., Bethlehem, Pa., through Bryant & Detwiler, contractors.
- 575 Tons, Ironton, Ohio, flood wall, to West Virginia Rail Co., Huntington, W. Va.
- 213 Tons, Chicago, Dearborn-Wacker garage, to Calumet Steel Co., Chicago.
- 190 Tons, Akron, Ohio, Elizabeth Park housing project, to Polak Steel Co., Cincinnati, through Lloyd Brothers, contractors.
- 160 Tons, Painesville, Ohio, Industrial Rayon plant, to Patterson-Leitch Co., Cleveland, through George A. Rutherford Co., Cleveland.
- 140 Tons, Licking and Muskegon Counties, Ohio, State project No. 273, to Ben Tom Supply Co., Columbus, through Hussy & Holderman.
- 101 Tons, Detroit, Scotten Avenue grade separation, to Great Lakes Steel Corp., through Concrete Steel Fireproofing Co.; Bryant & Detwiler, contractors.
- 100 Tons, Cleveland, joists for Benedictine school, to Truscon Steel Co., Youngstown, through Leo W. Schmidt.

WESTERN STATES

- 150 Tons, San Francisco, Union Oil Co. building, to Herrick Iron Works, Oakland, Cal., through MacDonald & Kahn, Ltd., San Francisco, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 500 Tons, Willowbrook, N. Y., nine dormitory buildings.
- 500 Tons, Willowbrook, N. Y., 10 hospital buildings; bids April 17.
- 360 Tons, Wilkes Barre, Pa., five pumping stations, U. S. Engineers.

- 250 Tons, Belleville, N. J., Andrew Jergens Co. plant.
- 237 Tons, Willington, Conn., bridge and culvert.
- 140 Tons, Long Island City, N. Y., spiral reinforcement; bids through Procurement Division, Treasury Department.

SOUTH AND CENTRAL

- 1600 Tons, Gravelly Point, Va., four Government hangars and terminal building; bids on general contract opened March 27.
- 495 Tons, Franklin and Madison Counties, Ohio, project No. 23; bids April 2.
- 340 Tons, Louisville, Ky., factory for Kentucky Macaroni Co.
- 240 Tons, Indianapolis, building for Vannogot Hardware Co.
- 185 Tons, Brown and Clermont Counties, Ohio, project No. 26; bids April 3.
- 100 Tons, Springfield, Ohio, joists for F. W. Woolworth store.

WESTERN STATES

- 345 Tons, Oleum, Cal., Pacific Gas & Electric Co. steam plant; MacDonald & Kahn, Ltd., San Francisco, contractor.
- 200 Tons, Alameda, Cal., bachelor officers' quarters at Navy air base; bids in.

U. S. Steel Pays \$1

UNITED STATES STEEL CORP. has declared a dividend of \$1 a share on common stock, payable April 26 to holders of record April 5.

\$1 on J. & L. Preferred

PITTSBURGH—At a meeting of the board of directors of Jones & Laughlin Steel Corp. this week the regular dividend on the cumulative 7 per cent preferred stock was passed but a dividend of \$1 per share was declared on account of arrearage in dividends on this stock to holders of record at the close of business April 8, payable April 15.

Case Offers New Tractor

RACINE, WIS.—The J. I. Case Co. is entering the low priced tractor field with two new models to start at \$625. They have four forward gears and a maximum speed of 10 miles an hour. The lower priced model is three-wheeled, the other four. The company also has designed implements for use with these tractors.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Mar. 26, 1940	Mar. 19, 1940	Feb. 27, 1940	Mar. 28, 1939	1940	1939
Fabricated structural steel awards	7,500	13,750	9,850	11,900	204,560	222,285
Fabricated plate awards	6,670	1,905	5,055	1,150	41,345	41,180
Steel sheet piling awards	380	970	1,790	3,540	8,770	14,105
Reinforcing bar awards	4,900	14,250	2,900	10,900	101,920	123,645
Total Letting of Construction Steel..	19,450	30,875	19,595	27,490	356,595	401,215

FABRICATED STEEL

... Lettings in small volume at 7500 tons, against 13,750 tons last week ... New projects drop to 6600 tons from 8700 tons a week ago ... Plate awards call for 6670 tons.

AWARDS

NORTH ATLANTIC STATES

- 505 Tons, Monroe County, N. Y., State highway bridge, to American Bridge Co., Pittsburgh.
- 300 Tons, Marcus Hook, Pa., supports for cracking cases, Sun Oil Co., to Phoenix Bridge Co., Phoenixville, Pa.
- 260 Tons, Philadelphia, bridges over Pennsylvania Railroad at 49th Street and Kingsessing Avenue, to Bethlehem Steel Co., Bethlehem, Pa.
- 250 Tons, Wawarsing, N. Y., highway bridges, contract No. 343, to Bethlehem Steel Co., Bethlehem, Pa.
- 225 Tons, Naugatuck, Conn., boiler house for Naugatuck Chemical Co., to Berlin Construction Co., Berlin, Conn.
- 225 Tons, Glenham, N. Y., research laboratory for Texas Co., to Lehigh Structural Steel Co., Allentown, Pa.
- 180 Tons, New York, alterations to subway, to Bethlehem Steel Co., Bethlehem, Pa.
- 165 Tons, Newark, N. J., Celluloid Co. building, to F. G. Schaefer Iron Works, Edgewater, N. J.
- 140 Tons, Bayonne, N. J., General Cable Co. building, to Belmont Iron Works, Philadelphia.
- 140 Tons, Washington County, Pa., highway bridge, route No. 113, to Fort Pitt Bridge Works Co., Pittsburgh.

THE SOUTH

- 700 Tons, Louisville, Ky., building for Joseph E. Seagram & Sons, to Whitehead & Kales, Detroit.
- 635 Tons, Pickens, S. C., industrial building, to Truscon Steel Co., Youngstown, Ohio.
- 580 Tons, Watts Bar Dam, Tenn., lock gates for TVA, to Lakeside Bridge & Steel Co., Milwaukee.
- 305 Tons, Terrebonne Parish, La., bridge, to Nashville Bridge Co., Nashville, Tenn.
- 110 Tons, Tillman County, Okla., bridge, to George C. Christopher & Son, Wichita, Kan.

CENTRAL STATES

- 300 Tons, La Crosse, Wis., power house for Tri-State Power Cooperative, to Mississippi Valley Structural Steel Co., St. Louis.
- 275 Tons, Lincoln, Neb., Kresge store, to Lincoln Steel Works, Lincoln, Neb.
- 230 Tons, Howe, Ill., Kankakee bridge No. 187.11, for New York Central Railroad Co., to American Bridge Co., Pittsburgh.
- 200 Tons, Cleveland, building extension for Aluminum Co. of America, to Bethlehem Steel Co.
- 200 Tons, Middletown, Ohio, office addition for American Rolling Mill Co., to International Steel Co., Evansville, Ind.
- 190 Tons, Cleveland, Benedictine High School, to Builders Structural Steel Co., Cleveland.
- 170 Tons, Chicago, Red Head Brand building, to Wendnagel & Co., Chicago.
- 170 Tons, Chicago Heights, Ill., melting shop, Columbia Tool Steel Co., to Mississippi Valley Structural Steel Co., Cicero, Ill. Plain shapes from Inland Steel Co., Chicago.
- 140 Tons, Pottsville, Mich., State bridge to R. C. Mahon Co., Detroit.
- 125 Tons, Chicago, addition, Chicago Tribune, to Bethlehem Steel Co., Bethlehem, Pa.
- 120 Tons, Stickney, Ill., Dewey & Almy chemical building, to Wendnagel & Co., Chicago.
- 110 Tons, Detroit, gym and auditorium for Sisters of St. Dominic, to Whitehead & Kales.

WESTERN STATES

- 427 Tons, Los Angeles, bearing piles for County of Los Angeles, to Columbia Steel Co., Los Angeles.
- 100 Tons, Long Beach, Cal., bearing piles for city harbor project, to Bethlehem Steel Co., Los Angeles.
- Unstated tonnage, Burbank, Cal., Lockheed Aircraft Corp. assembly building No. 8, to Bethlehem Steel Co., Los Angeles.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 1200 Tons, Bethesda, Md., Naval Medical Center buildings.

- 330 Tons, New York, civil aeronautics administration building, North Beach Airport, for Treasury Department.
- 319 Tons, Sullivan and Armstrong Counties, Pa., highway bridges; bids close April 5.
- 220 Tons, Newark, N. J., plant addition for Hygienic Tube & Container Corp.
- 200 Tons, Rochester, N. Y., building for Harold H. Clapp, Inc.
- 200 Tons, Pittsburgh, incinerator garage for city.
- 120 Tons, Reading, Pa., store building for S. S. Kresge Co.
- 110 Tons, Rochester, N. Y., building for W. W. Vicinus.

THE SOUTH

- 550 Tons, Louisville, Ky., factory building for Kentucky Macaroni Co.
- 300 Tons, McCreary County, Ky., state bridge.

CENTRAL STATES

- 500 Tons, East St. Louis, Ill., warehouse for Obear-Nester Glass Co.
- 275 Tons, Midland, Mich., factory building for Dow Chemical Co.
- 250 Tons, Sheboygan, Mich., State bridge.
- 220 Tons, Cleveland, skip bridge for Republic Steel Corp.
- 175 Tons, Chicago, store building for Sears, Roebuck & Co.
- 120 Tons, Benzie County, Mich., State bridge.
- 120 Tons, Thompsonville, Mich., State bridge.
- 120 Tons, Fox Lake, Ill., bridge A-426.
- 120 Tons, La Grange, Ill., building addition for Electro-Motive Corp.

WESTERN STATES

- 400 Tons, Gibbon, Wash., bridge No. 34 for Northern Pacific Railway.
- 315 Tons, Oakland, Cal., municipal airport hangar; bids April 1.
- 300 Tons, Vancouver, Wash., transmission line to plant of Aluminum Co. of America; bids in.

NLRB Orders Hanna Ore Union Disestablished

WASHINGTON—In a decision announced on Monday, the National Labor Relations Board required the Hanna Iron Ore Co. of Delaware and its three mine operating subsidiaries, Homer Ore Co., Hanna Iron Ore Co. and American Boston Mining Co., together with their operating agent, the M. A. Hanna Co., all of Iron River, Mich., to withdraw all recognition from the Mine Workers Union and completely disestablish it as a collective bargaining agency for any of its employees.

The board stated that a secret ballot election would be held, "at a future date when the effects of the companies' unfair labor practices have been dissipated," to determine whether or not the employees desire to be represented for the purpose of collective bargaining by SWOC's Local 1624. The board ruled that all the employees at the companies' five mines, excluding clerical and supervisory employees and mine policemen, constitute an appropriate bargaining unit. The mines involved are the Homer, the Bates, Hia-

- 165 Tons, Isleton, Cal., Georgiana Slough bridge; bids April 15.
- 145 Tons, Odair, Wash., penstock coaster gate hoists for Grand Coulee Dam (Specification 905); bids April 22.

FABRICATED PLATES

AWARDS

- 3600 Tons, Pittsburgh, 10 tank barges for Campbell Transportation Co., three, 240 x 50 x 10.6 ft., to American Bridge Co., Pittsburgh; seven, 195 x 35 x 9.6 ft., to Dravo Corp., Pittsburgh.
- 1300 Tons, Huntington, W. Va., eight barges for Island Creek Coal Co., to Bethlehem Steel Co.
- 895 Tons, Brooklyn, tanks for Patchogue Oil Terminal Corp., to J. K. Welding, Inc., Brooklyn.
- 750 Tons, Sewaren, N. J., tanks for Shell Oil Co., to Chicago Bridge & Iron Co., Chicago.
- 600 Tons, Fort Peck, Mont., tunnel extension, to Chicago Bridge & Iron Co., Chicago.
- 126 Tons, Coram, Cal., by-pass and air inlet piping for main unit penstocks of Shasta Dam (Specification 1330-D), to Provo Foundry & Machinery Co., Provo, Utah.

PENDING PROJECTS

- 1000 Tons, Earp, Cal., penstocks for Parker power plant (Specifications 898); bids April 15.
- 825 Tons, Mono County, Cal., Leevining Creek conduit (Specification 3374); bids April 2. (Corrects previously reported tonnage.)
- 340 Tons, Friant, Cal., outlet pipes for Friant Dam (Specifications 903); bids April 18.
- 300 Tons, Odair, Wash., penstock coaster gates for Grand Coulee Dam (Specifications 905); bids April 22.

SHEET PILING

AWARDS

- 280 Tons, Indiana Harbor, Ind., Texas Co. dock, to Inland Steel Co., Chicago, through Great Lakes Dredge & Dock Co., Chicago.
- 100 Tons, Los Angeles, for County of Los Angeles, to Columbia Steel Co., Los Angeles.

PENDING PROJECTS

- 800 Tons, Cleveland, Cuyahoga River improvement, contract No. 22, Cut 5-C; L. A. Wells Construction Co., Cleveland, low bidder.

watha No. 1, Hiawatha No. 2 and the Rogers.

New Type Steam Engine Reported from Reich

WASHINGTON—A steam engine of revolutionary design, weighing only a fraction of the conventional type and utilizing light metal pistons for the first time in a steam engine, is claimed to be in the process of development in Germany, according to reports received by the Commerce Department.

Developed by Dr. Ing. Lentz, well known construction engineer, the engine will permit a saving of 30 per cent in space with a steam consumption of only 70 lb. per hp. and a power utilization of 92 per cent. The Lentz engine utilizes a multiple-cylinder, even-pressure system and has three, six or nine cylinders arranged on one crankshaft. Its design was described as similar to that of an internal combustion engine with no cross head.

Designed principally for use on ships, the new engine operates at a high number of revolutions per minute, the report said.

...NON-FERROUS...

... Demand dull all week ... Lead reduced \$2 a ton ... Ingot aluminum down 1c. a lb. ... Resale copper weak.

NEW YORK, March 26—Buying of non-ferrous metals was extremely dull all last week. Quotations on lead and aluminum were revised downward. Copper buying was well below the 1000-ton mark during the week and the poor demands brought further weakening of prices in the outside market. At the close of the week 11.30c., delivered Valley, was asked in the open market and it is understood that 11.25c.

was acceptable to some custom smelters. Producers, however, continue to quote on the basis of 11.50c. per lb., delivered Connecticut Valley. Sales for the month through Saturday were about 17,000 tons, or an average of 850 tons a day. Sales in the comparable period of February amounted to 138,000 tons. Export interest was light all week and nearby metal for export is quoted today nominally at 11.35c. per lb.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Mar. 26	Mar. 21	Mar. 22	Mar. 23	Mar. 25	Mar. 26
Copper, Electrolytic	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	46.625	46.75	46.75	46.625	46.60	46.60
Zinc, East St. Louis	5.75	5.75	5.75	5.75	5.75	5.75
*Lead, St. Louis	5.00	5.00	5.00	5.00	5.00	5.00

*Quotation of March 19 revised to 5c.

¹ Delivered Conn. Valley. Deduct 1/2c. for New York delivery. ² Add 0.25c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	47.25c.	52.00c.
Copper, Lake	13.25c.	12.625c.
Copper, electro	12.75c.	12.625c.
Copper, castings	12.375c.	12.375c.
*Copper sheets, hot-rolled	20.12c.	20.12c.
*Yellow brass sheets	18.31c.	18.31c.
*Seamless brass tubes	21.06c.	21.06c.
*Seamless copper tubes	20.62c.	20.62c.
*Yellow brass rods	14.26c.	14.26c.
Zinc slabs	7.10c.	7.75c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig	6.15c.	5.75c.
Lead, bar	8.10c.	8.50c.
Lead, sheets, cut	8.50c.	8.50c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	20.50c.	21.50c.
Alum., No. 1 remelt., 98 to 99 per cent	18.00c.	18.50c.
Solder, 1/2 and 1/4	29.45c.	30.00c.
Babbitt metal, anti-friction grade	20.00c.†	20.25c.

†Revised.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/4; on brass sheets and rods, 40; on brass tubes, 33 1/4, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying	Dealers' Selling
Copper, hvy. crucible	9.25c.	9.875c.
Copper, hvy. and wire	8.25c.	8.625c.
Copper, light and bottoms	7.25c.	7.75c.
Brass, heavy	5.00c.	5.50c.
Brass, light	4.125c.	4.875c.
Heavy machine composition	7.75c.	8.375c.
No. 1 yel. brass turnings	4.75c.	5.75c.
No. 1 red brass or composition turnings	7.25c.	8.75c.
Lead, heavy	4.00c.	7.375c.
Cast aluminum	7.75c.	8.75c.
Sheet aluminum	13.75c.	14.75c.
Zinc	2.75c.	4.00c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$183 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11.75c. a lb.

Zinc

Prime Western sales in the past week amounted to 421 tons, as compared with 402 tons in the preceding period, and shipments were 3569 tons against 3093 tons in the previous week. Undelivered contracts now stand at 36,341 tons. Quotations were unchanged all week at 6.14c. per lb., New York. Despite the extended absence of buying support, sellers have obtained a measure of encouragement from the fact that shipments are holding up remarkably well and stocks are rapidly reaching the point where replenishment will be imperative.

Lead

The poor demand of the past two weeks brought a reduction of \$2 a ton late last Wednesday by a leading custom smelter, establishing the market at 5.15c. per lb., New York. Other interests immediately met this price. The reduction did not have any effect in the way of spurring business, for sales since the price cut have continued to be limited almost entirely to carlots for April. April requirements are at present about two-thirds covered, while March is practically all bought.

Aluminum

Ingot prices have been reduced, effective March 25, 1c. to 19c. per lb. by Aluminum Co. of America. Prices on fabricated products have also been revised downward. This price change is the first since March, 1937, when quotations were advanced 1c. to 20c. The 19c. price rules on carlot business; quantities of one ton, are quoted at 19.50c., and less than one ton at 20c.

Tin

Prospects of a more aggressive war policy on the part of England and France resulted in firmer prices toward the close of the past week. But the market was unable to hold this gain and prices slumped sharply today and yesterday, with Straits metal being quoted today at 46c. per lb., New York. This price, representing imports purchased with the "official" pound, is equal to about 40.25c. on the basis of the "free" pound. Despite the decline over the week-end, buyers continue to hold back and very little trading is being done. London prices were off this morning to £247 5s for cash standards.

New McKenna Laboratory

LATROBE, PA.—McKenna Metals Co. has begun construction of a new research laboratory which will consist of a one-story building, 40 x 80 ft. The laboratory proper will be insulated in the side walls as well as the ceiling. The entire building will be of pre-fabricated steel sheet construction, supplied and assembled by Blaw-Knox Co. According to Philip McKenna, president, the company's business has expanded to such a point that increased plant space was necessary.

IRON AND STEEL SCRAP

... Ability of mills to buy at lower prices sends composite down 25c. to \$16.29.

MARCH 26—Mill sales at Chicago at 25c. below the level of a week ago Monday have depressed the whole list a like amount, although brokers are able to cover none too freely at a profit. Two mills in eastern Pennsylvania were able to pick up No. 1 steel at 50c. below the previous market and at a price in line with what brokers are paying to cover old orders. At Pittsburgh, the market undertone is softer, but no change in quotations is warranted. As a result of these movements, the composite price has declined 25c. to \$16.29, from \$16.54 the week before.

In many sections, unseasonably cold weather is holding back the flow of scrap, particularly from country districts, but only in Canada has this condition proved a strengthening factor in the market. Most markets are dull and unchanged in price quotations, the general tendency being to mark time. Following speculative bidding at Detroit, sentiment has turned bearish and a decline is anticipated.

For the four weeks of March, the monthly average of THE IRON AGE composite price was \$16.56, as compared with \$16.875 in February and \$17.575 in January. In March, 1939, the average was \$15.20.

Pittsburgh

The market continues exceptionally dull with very few transactions occurring. If anything, the market undertone is softer but No. 1 heavy melting remains quothably unchanged this week at \$16.50 to \$17. Likewise, other grades of scrap are unchanged but further clarification is expected when railroad lists close next month.

Chicago

Sales of heavy melting steel were made to the leading buyer from the middle of last week to Monday of this week at \$15.50 a gross ton delivered, down 25c. a ton from the purchase price on Monday a week ago. As of Tuesday of this week, this mill was being offered more steel at \$15.50 than was needed. Brokers are offering dealers \$15.25, but material is not yet coming out freely and some dealers have not yet sold at that figure. No. 1 is quoted therefore at \$15.25 to \$15.50. The unseasonably cold weather is holding back material from the country, which probably would have been in dealers' yards by now were the temperature higher.

Philadelphia

Conflicting trends persist in the market here. A district mill has purchased a

moderate tonnage of No. 1 steel at \$16.50, representing a decline of 50c. from the quotations of a week ago, but on the other hand dealers are generally paying \$16.50 in covering old orders. A producer in the Harrisburg area has also obtained \$16.50 on several moderate tonnages of No. 1. Foundry demand continues fairly active and all cast quotations are strong. Sales of both heavy breakable and stove plate have been made recently within the quoted ranges. Part of the present sensitivity of the market is derived from the fact that dealers' yard stocks are not too plentiful and new material is coming out very slowly.

Youngstown

The period of quiet continues unbroken here. New transactions are scarce and not much scrap is moving against old orders. No. 1 heavy melting steel price is reduced by 25c. per ton this week, a nominal adjustment. Actually the \$17.50 level, which has prevailed in recent weeks, is not out of line considering the fact No. 1 heavy melting steel specifications in this area call for more railroad steel than required in some other nearby districts.

Cleveland

Hand-to-mouth sales and shipments continue to rule the market here. The movement is slightly better than at mid-winter but continued cold weather has restricted collections. Dealers are hoping that some activity will develop next week either just prior to or immediately after the closing of the railroad lists.

Buffalo

A negligible volume of business was done in the scrap market this week. One consumer is offering \$16 for No. 1 steel but dealers do not appear to be interested. As mill operations continue to show no signs of increased activity, the trade has a tendency to become pessimistic.

St. Louis

With the mills in the St. Louis district out of the market and dealers' short interest pretty well covered, the scrap iron market is dull. Mill inventories are ample for present production, which has been curtailed for lack of orders for finished products. Most items are unchanged. Railroad lists: Pennsylvania, 23,000 tons; St. Louis-San Francisco, 3000 tons; Baltimore & Ohio, 6000 tons; Chicago, Milwaukee, St. Paul & Pacific, 700 tons.

Cincinnati

The local scrap market continues to mark time. While general market conditions continue to be soft, dealers' anticipation of an imminent improvement in demand has restrained any tendency toward a further cut in present bids. Mills show relatively no interest in substantial commitments, while those under continuing contracts are not specifying actively.

Birmingham

Continued reduction in operations plus inability to make any foreign shipments of scrap continues to retard any possible advance in Birmingham scrap circles. Dealers find themselves with some greater tonnage in accumulations but not enough to create any problem out of the routine. Larger buyers are still shy of entering the market and as a result movements are continuing in small volume as has been the situation since the holidays.

Detroit

Continued hold-up of shipment of almost all scrap grades at the mill of the principal consumer has frozen the market in an inactive state but shipping restrictions possibly will be lifted April 1. Price quotations are nominal but remain, for lack of any suitable gage, at the level to which they were forced when speculative prices were revealed a short while ago. The usual group of automotive lists will be subject to bids closing on Friday of this week and on Monday. Sentiment of both dealers and brokers is bearish, heightened by a feeling that the relatively high speculative level is a false one.

New York

Broker buying prices are somewhat easier in line with the softness of the eastern Pennsylvania market. No 1 steel, boring and turnings are quoted lower, but heavy breakable cast is stronger. Vessel movement is better, but there is still more than a normal amount of material on barges and no particular effort is being made to draw out scrap. Many brokers are paying for material delivered to barges, the low end of the quoted price range, which is unchanged from last week.

Boston

With Pennsylvania mills apparently not interested in steel turnings, blast furnace material and bundled skeleton, the market is left flat so far as domestic delivery is concerned. The common price now quoted by brokers for steel turnings is \$4.15 a ton on cars, down 50c. from a week ago; on blast furnace material \$3.15 a ton on cars, down \$1; and on bundled skeleton \$8 a ton on cars, down 25c. There has not been enough doing in other materials to establish prices. Export prices are holding firm. However, exporters are not optimistic regarding the future, their impression being that the supply of vessel space will materially shrink before another fortnight passes.

Toronto

Higher prices were put into effect by Canadian scrap dealers during the week, with cast scrap and stove plate marked up 50c. per ton while steel turnings and cast borings were advanced 25c. per ton. Prices on other materials remain firm. Scrap offerings have dropped sharply and local dealers state there is very little steel scrap available in the Toronto area. One local dealer has about 5000 tons of steel scrap in northern Ontario which will be shipped about the middle of April. At present, however, very little scrap is coming down from the northern areas. Demand for steel and iron scrap is holding steady. No. 1 cast scrap is scarce and there is not enough available to meet spot needs.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.50 to \$17.00
Railroad heavy melting	17.75 to 18.25
No. 2 heavy melting	15.00 to 15.50
Railroad scrap rails	17.75 to 18.25
Rails 3 ft. and under	20.50 to 21.90
Comp. sheet steel	16.50 to 17.00
Hand bundled sheets	15.50 to 16.00
Heavy steel axle turn.	14.50 to 15.00
Machine shop turnings	10.50 to 11.00
Short, shov. turnings	12.00 to 12.50
Mixed bor. & turn.	8.75 to 9.25
Cast iron borings	8.75 to 9.25
Cast iron carwheels	18.50 to 19.00
Heavy breakable cast.	15.00 to 15.50
No. 1 cupola cast	18.00 to 18.50
RR. knuckles & coup.	20.50 to 21.00
Rail coil springs	20.50 to 21.00
Rail leaf springs	20.50 to 21.00
Rollad steel wheels	20.50 to 21.00
Low phos. billet crops	21.00 to 21.50
Low phos. punchings	20.50 to 21.00
Low phos. heavy plate	19.50 to 20.00
Railroad malleable	21.00 to 21.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.50 to \$17.00
No. 2 hvy. mltng. steel.	16.00 to 16.50
Hydraulic bund., new	16.50 to 17.00
Hydraulic bund., old	14.00 to 14.50
Steel rails for rolling	20.50 to 21.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast.	18.50
No. 1 cupola cast	20.00 to 20.50
Mixed yard (rd'y) cast	16.50
Stove plate (steel wks.)	15.00 to 15.50
Railroad malleable	21.00 to 22.00
Machine shop turn.	10.00 to 10.50
No. 1 blast furnace	9.50 to 10.00
Cast borings	10.50 to 11.00
Heavy axle turnings	15.00 to 15.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rollad steel wheels	21.00 to 21.50
Steel axles	21.50 to 22.00
Shafting	22.00 to 22.50
Spec. iron & steel pipe	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$15.25 to \$15.50
Auto. hvy. mltng. steel alloy free	14.25 to 14.50
No. 2 auto steel	12.25 to 12.75
Shoveling steel	15.25 to 15.50
Factory bundles	14.75 to 15.00
Dealers' bundles	13.25 to 13.50
No. 1 busheling	14.25 to 14.50
No. 2 busheling, old	5.25 to 5.75
Rollad carwheels	17.50 to 18.00
Railroad tires, cut	17.75 to 18.25
Railroad leaf springs	17.25 to 17.75
Steel coup. & knuckles	17.25 to 17.75
Axle turnings	14.00 to 14.50
Coil springs	18.25 to 18.75
Axle turn. (elec.)	15.75 to 16.25
Low phos. punchings	17.50 to 18.00
Low phos. plates 12 in. and under	17.00 to 17.50
Cast iron borings	8.50 to 9.00
Short shov. turn.	9.00 to 9.50
Machine shop turn.	8.25 to 8.75
Re-rolling rails	17.75 to 18.25
Steel rails under 3 ft.	17.00 to 17.50
Steel rails under 2 ft.	18.00 to 18.50
Angle bars, steel	17.25 to 17.75
Cast iron carwheels	16.50 to 17.00
Railroad malleable	17.75 to 18.25
Agric. malleable	13.75 to 14.25

Per Net Ton	
Iron car axles	21.00 to 21.50
Steel car axles	19.75 to 20.25
Locomotive tires	13.75 to 14.25
Pipes and flues	10.25 to 10.75
No. 1 machinery cast.	13.00 to 13.50
Clean auto. cast	13.25 to 13.75
No. 1 railroad cast	12.75 to 13.25
No. 1 agric. cast.	11.50 to 12.00
Stove plate	8.25 to 8.75
Grate bars	9.00 to 9.50
Brake shoes	10.00 to 10.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.75 to \$17.25
No. 2 hvy. mltng. steel.	15.75 to 16.25
Low phos. plate	19.75 to 20.25
No. 1 busheling	16.00 to 16.50
Hydraulic bundles	16.25 to 16.75
Machine shop turn.	10.75 to 11.25

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.00 to \$16.50
No. 2 hvy. mltng. steel.	15.00 to 15.50
Comp. sheet steel	15.50 to 16.00
Light bund. stampings	13.00 to 13.50
Drop forge flashings	14.00 to 14.50
Machine shop turn.	8.50 to 9.00
Short shov. turn.	9.50 to 10.00
No. 1 busheling	14.75 to 15.25
Steel axle turnings	14.50 to 15.00
Low phos. billet and bloom crops	20.50 to 21.00
Cast iron borings	9.50 to 10.00
Mixed bor. & turn.	9.50 to 10.00
No. 2 busheling	9.50 to 10.00
No. 1 cupola cast	17.00 to 17.50
Railroad grate bars	13.50 to 14.00
Stove plate	13.50 to 14.00
Rails under 3 ft.	20.50 to 21.00
Rails for rolling	20.00 to 20.50
Railroad malleable	19.50 to 20.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.00 to \$16.50
No. 2 hvy. mltng. steel.	14.50 to 15.00
Scrap rails	17.00 to 17.50
New hvy. b'ndled sheets	14.50 to 15.00
Old hydraul. bundles	12.50 to 13.00
Drop forge flashings	14.00 to 14.50
No. 1 busheling	14.00 to 14.50
Machine shop turn.	9.50 to 10.00
Shov. turnings	12.50 to 13.00
Mixed bor. & turn.	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Knuckles & couplers	20.00 to 21.00
Coil & leaf springs	20.00 to 21.00
Rollad steel wheels	20.00 to 21.00
No. 1 machinery cast.	17.50 to 18.00
No. 1 cupola cast	16.50 to 17.00
Stove plate	14.50 to 15.00
Steel rails under 3 ft.	21.50 to 22.00
Cast iron carwheels	17.50 to 18.00
Railroad malleable	19.00 to 19.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$14.50 to \$15.00
No. 1 hvy. melting	14.25 to 14.75
No. 2 hvy. melting	13.00 to 13.50
No. 1 locomotive tires	15.25 to 15.75
Misc. stand sec. rails	15.25 to 15.75
Railroad springs	16.00 to 16.50
Bundled sheets	9.00 to 9.50
No. 1 busheling	13.00 to 13.50
Cast bor. & turn.	5.25 to 5.75
Machine shop turn.	6.50 to 7.00
Heavy turnings	10.00 to 10.50
Rails for rolling	17.50 to 18.00
Steel car axles	18.00 to 18.50
No. 1 RR wrought	10.50 to 11.00
No. 2 RR wrought	13.25 to 13.75
Steel rails under 3 ft.	18.00 to 18.50
Steel angle bars	14.75 to 15.25
Cast iron carwheels	15.00 to 16.00
No. 1 machinery cast.	17.00 to 17.50
Railroad malleable	15.75 to 16.25
Breakable cast	14.00 to 14.50
Stove plate	11.25 to 11.75
Grate bars	10.00 to 10.50
Brake shoes	11.00 to 11.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	\$12.50 to \$13.00
No. 2 hvy. mltng. steel.	10.50 to 11.00
Scrap rails for mltng.	17.00 to 17.50
Loose sheet clippings	8.00 to 8.50
Hydrau. b'ndled sheets	12.00 to 12.50
Cast iron borings	3.75 to 4.25
Machine shop turn.	5.00 to 5.25
No. 1 busheling	9.00 to 9.50
No. 2 busheling	3.00 to 3.25
Rails for rolling	18.50 to 19.00
No. 1 locomotive tires	14.00 to 14.50
Short rails	19.00 to 19.50
Cast iron carwheels	14.50 to 15.00
No. 1 machinery cast.	16.00 to 16.50
No. 1 railroad cast.	14.00 to 14.50
Burnt cast	7.75 to 8.25
Stove plate	7.75 to 8.25
Agricul. malleable	12.50 to 13.00
Railroad malleable	15.50 to 16.00
Mixed hvy. cast.	13.50 to 14.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$15.00
No. 2 hvy. melting steel	14.00
No. 1 busheling	14.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00

Rails for rolling	\$16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	18.00
No. 1 RR wrought	14.00
No. 1 cast	16.00
No. 2 cast	12.50
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	\$12.50 to \$13.00
No. 2 hvy. mltng. steel	11.50 to 12.00
Borings and turnings	6.75 to 7.25
Long turnings	7.25 to 7.75
Short shov. turnings	8.25 to 8.75
No. 1 machinery cast.	14.50 to 15.00
Automotive cast	15.50 to 16.00
Hvy. breakable cast.	11.50 to 12.00
Stove plate	8.75 to 9.25
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel	12.00 to 12.50
Sheet clippings	8.50 to 9.50
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.25

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$12.50 to \$13.00
No. 2 hvy. mltng. steel.	11.00 to 11.50
Hvy. breakable cast.	14.00 to 14.50
No. 1 machinery cast.	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Clean steel turnings	5.00 to 5.50
Cast borings	5.00 to 5.50
No. 1 blast furnace	5.00 to 5.50
Cast borings (chem.)	Nominal
Unprepared yard scrap	6.50 to 7.00
Light iron	5.00 to 5.50
Per gross ton delivered local foundries:	
No. 1 machin. cast.	\$17.00 to \$18.50
No. 2 cast	16.50 to 17.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	\$12.75 to \$13.00
Machine shop turn.	4.15
Mixed bor. & turn.	3.15
Bun. skeleton long	7.75 to 8.00
Shafting	17.00 to 17.25
Stove plate	9.75 to 10.00
Cast bor. chemical	8.00 to 8.50
Per gross ton delivered consumers' yards:	
Textile cast	\$17.50 to \$19.00
No. 1 machine cast.	17.50 to 19.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel.	\$13.25
No. 2 steel	12.25

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$10.50 to \$12.50
No. 2 hvy. mltng. steel.	9.50 to 11.50

CANADA

Dealers' buying prices at these yards, per gross ton:

Toronto Montreal	
Low phos. steel	\$11.50 \$11.00
No. 1 hvy. mltng. steel.	11.00 10.50
No. 2 hvy. mltng. steel.	9.75 9.25
Mixed dealers steel	8.75 8.25
Drop forge flashings	9.75 9.25
New loose clippings	8.75 8.25
Busheling	6.00 5.50
Scrap pipe	7.75 7.25
Steel turnings	7.25 6.75
Cast borings	6.75 6.25
Machinery cast	17.50 17.00
Dealers' cast	16.50 16.00
Stove plate	12.50 12.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	\$13.50 to \$14.00
No. 2 hvy. mltng. steel.	11.50 to 12.50
No. 2 cast	12.00 to 12.50
Stove plate	10.00 to 10.50

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	\$15.50
No. 2 hvy. mltng. steel.	14.50
Rail (scrap)	\$15.50 to 15.75
Stove plate	8.25 to 8.50

Philadelphia, delivered alongside boats, Port Richmond.

No. 1 hvy. mltng. steel.	\$16.25 to \$16.50
No. 2 hvy. mltng. steel.	15.25

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are effected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling \$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or besse-
mer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and
sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.
Pittsburgh, Chicago or Cleve-
land 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.45c.
Galveston 2.25c.
9/32 in. to 47/64 in. \$3 a net ton higher.
Quantity extras apply.

SOFT STEEL BARS

Base per Lb.

Pittsburgh, Chicago, Gary,
Cleveland, Buffalo and Birm-
ingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary,
Cleveland, Buffalo, Birming-
ham 2.05c.
On cars dock Tex. Gulf ports... 2.40c.
On cars dock Pacific ports 2.65c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary,
Birmingham, Buffalo, Cleve-
land, Youngstown or Spar-
rows Pt. 1.90c.*
Detroit, delivered 2.00c.*
On cars dock Tex. Gulf
ports 2.25c.*
On cars dock Pacific
ports 2.25c.*

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Buf-
falo, Cleveland, Youngstown
or Birmingham 1.90c.*
Detroit, delivered 2.00c.*
On cars dock Tex. Gulf parts... 2.25c.*
On cars dock Pacific ports... 2.25c.*

* The so-called published price on new billet reinforcing bars is \$5 more than shown above and the so-called published price on rail steel reinforcing bars is \$2 more than the prices shown above. The above quotations, however, represent the average going price of reinforcing steel bars. Occasionally orders are booked at above these levels, but for the most part jobs have been going at or below the equivalent of 1.90c. f.o.b. Pitts-
burgh, Chicago, Cleveland, etc.

IRON BARS

Chicago 2.25c.
Pittsburgh (refined) 3.75c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland,
Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

Base per Lb.

Pittsburgh, Chicago, Gary,
Birmingham, Sparrows Point,
Cleveland, Youngstown,
Coatesville, Claymont,
Del. 2.10c.
Philadelphia, del'd 2.15c.
New York, del'd 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg.... 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh, Chicago, Gary, Buf-
falo, Bethlehem or Birming-
ham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than
60 lb., per gross ton \$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets) per
gross ton \$40.00
Light rails (from rail steel) per
gross ton 39.00

Base per Lb.

Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports. 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes
(per 100 counts) 65-5

Basing points on light rails are Pittsburgh,
Chicago and Birmingham; on spikes and tie
plates, Pittsburgh, Chicago, Portsmouth, Ohio,
Weirton, W. Va., St. Louis, Kansas City,
Minneapolis, Colo., Birmingham and Pacific Coast
ports; on tie plates alone, Steelton, Pa.,
Buffalo; on spikes alone, Youngstown, Lebanon
Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.

Pittsburgh, Gary, Birming-
ham, Buffalo, Sparrows Point,
Cleveland, Youngstown, Mid-
dletown or Chicago 2.10c.
Detroit, delivered 2.20c.
Philadelphia, delivered 2.27c.
Granite City 2.20c.
On cars dock Pacific ports 2.60c.
Wrought iron, Pittsburgh 4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo,
Youngstown, Cleveland, Mid-
dletown or Chicago 3.05c.
Detroit, delivered 3.15c.
Granite City 3.15c.
Philadelphia, delivered 3.37c.
On cars dock Pacific ports 3.65c.

* Mill run sheets are 10c. per 100 lb. less than
base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary,
Sparrows Point, Buffalo,
Middletown, Youngstown or
Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron, Pittsburgh 6.10c.

Electrical Sheets (F.o.b. Pittsburgh)

Base per Lb.

Field grade 3.20c.
Armature 3.55c.
Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.15c.

Silicon Strip in coils—Sheet price plus sil-
icon sheet extra width extra plus 25c per 100
lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating
f.o.b. Pittsburgh or Gary.... 3.80c.
F.o.b. cars dock Pacific ports. 4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary,
Youngstown, Middletown or
Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports.... 3.95c.

TIN MILL PRODUCTS

Tin Plate

Per Base Box

Standard cokes, Pittsburgh, Chi-
cago and Gary (100 lb.) \$5.00
Standard cokes, Granite City
(100 lb.) 5.10

Special Coated Manufacturing Ternes

Per Base Box

Granite City \$4.40
Pittsburgh or Gary 4.30

Roofing Terne Plate

(F.o.b. Pittsburgh per Package,
112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

Black Plate, 29 gage and lighter*

Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports,
boxed 4.00c.

* Black plate base price applies to
29 gage within certain width and
length limitations.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.

Pittsburgh, Chicago, Gary,
Cleveland, Middletown,
Youngstown or Birmingham 2.10c.
Detroit, delivered 2.20c.
On cars dock Pacific ports 2.70c.

Cooperage Stock

Pittsburgh & Chicago 2.20c.

COLD ROLLED STRIP*

Base per Lb.

Pittsburgh, Youngstown or
Cleveland 2.80c.
Chicago 2.90c.
Detroit, delivered 2.90c.
Worcester 3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or
Cleveland 2.95c.
Detroit, delivered 3.05c.
Worcester 3.35c.

COLD ROLLED SPRING STEEL

Pittsburgh

and
Cleveland Worcester

	Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.	
Carbon	0.76-1.00	6.15c.	6.35c.	
Carbon	1.01-1.25	8.35c.	8.55c.	

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.60c.
Spring wire	3.20c.

To the Trade

	Base per Keg
Standard wire nails	\$2.55
Coated nails	2.55
Cut nails, carloads	3.55

Base per 100 Lb.

Annealed fence wire	\$3.05
Woven wire fence, 15 1/2 gage and heavier base col.	67
Fence posts (carloads), base col.	69
Single loop bale ties, base col.	56
Galvanized barbed wire on 80-rod spools (carloads) base col.	70
Twisted barless wire, base col.	70

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

In.	Steel Black Galv.	Butt Weld Wrought Iron Black Galv.
1/2	56	36
3/4	59	43 1/2
1	63 1/2	54
1 1/4	66 1/2	58 1/2
1 1/2	68 1/2	60 1/2

In.	Lap Weld	Butt Weld
2	61	52 1/2
2 1/2	64	55 1/2
3	66	57 1/2
3 1/2	68	59 1/2
4	70	61 1/2
4 1/2	72	63 1/2
5	74	65 1/2
5 1/2	76	67 1/2
6	78	69 1/2

In.	Butt weld, extra strong, plain ends
1/2	54 1/2
3/4	56 1/2
1	58 1/2
1 1/4	60 1/2
1 1/2	62 1/2
1 3/4	64 1/2
2	66 1/2

In.	Lap weld, extra strong, plain ends
2	59
2 1/2	61
3	63
3 1/2	65
4	67
4 1/2	69
5	71
5 1/2	73
6	75

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

In.	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d.	13 B.W.G.	\$ 9.01	\$ 7.82
1 1/4 in. o.d.	13 B.W.G.	10.67	9.26
1 1/2 in. o.d.	13 B.W.G.	11.70	10.23
1 3/4 in. o.d.	13 B.W.G.	13.42	11.64
2 in. o.d.	13 B.W.G.	15.03	13.04
2 1/4 in. o.d.	13 B.W.G.	16.76	14.54
2 1/2 in. o.d.	13 B.W.G.	18.45	16.01
2 3/4 in. o.d.	13 B.W.G.	20.21	17.54
3 in. o.d.	13 B.W.G.	22.48	19.50
3 1/4 in. o.d.	11 B.W.G.	28.37	24.62
4 in. o.d.	10 B.W.G.	35.20	30.54
4 1/2 in. o.d.	10 B.W.G.	42.04	37.35
5 in. o.d.	9 B.W.G.	54.01	46.87
6 in. o.d.	7 B.W.G.	82.93	71.98

Extras for less carload quantities:

Quantity	Base	Discount
40,000 lb. or ft. over	5%	
30,000 lb. or ft. to 39,999 lb. or ft.	10%	
20,000 lb. or ft. to 29,999 lb. or ft.	15%	
10,000 lb. or ft. to 19,999 lb. or ft.	20%	
5,000 lb. or ft. to 9,999 lb. or ft.	30%	
2,000 lb. or ft. to 4,999 lb. or ft.	45%	
Under 2,000 lb. or ft.	65%	

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	\$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, \$3 extra 4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45. Birmingham, and \$53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
1/2 in. and 6 in. and smaller	68 1/2
Larger and longer up to 1 in.	66
1 1/4 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclusive	64
1 1/4 in. to 1 1/2 in. incl.	62
1 3/4 in. and larger	60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E.	
1/2 in. and smaller	67
9/16 to 1 in.	64
1 1/4 in. through 1 1/2 in.	62
1 3/4 in. and larger	60

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72 1/2
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83 1/2
On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.	

Large Rivets

(1/2 in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland	
Chicago, Birmingham	\$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland,	
Chicago, Birmingham	65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws,	
1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread 1/4 in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.	
Open-hearth grade, base	2.70c.
Delivered, Detroit	2.80c.
S.A.E.	
Series	Differential
Numbers	per 100 Lb.
200 (1/2% Nickel)	\$0.35

2100 (1 1/2% Nickel)	\$0.75
2300 (3 1/2% Nickel)	1.55
2500 (5% Nickel)	2.25
31 Nickel-chromium	0.70
3200 Nickel-chromium	1.55
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum	
(0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum	
(0.25 to 0.40 Molybdenum)	0.75
4340 Chr.-Ni.-Mo.	1.65
4345 Chr.-Ni.-Mo.	1.85
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.35

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

	Chromium-Nickel	No. 304	No. 302
Forging billets	21.25c.	20.40c.	
Bars	25c.	24c.	
Plates	29c.	27c.	
Structural shapes	25c.	24c.	
Sheets	36c.	34c.	
Hot-rolled strip	23.50c.	21.50c.	
Cold-rolled strip	30c.	28c.	
Drawn wire	25c.	24c.	

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot stp.	17c.	17.50c.	24c.	35c.
Cold stp.	22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton

f.o.b. United Kingdom Ports

Ferromanganese, ex-	
port	£17 18s.
Tin plate, per base	
box	32s. to 33s.
Steel bars, open hearth	13£ 9s.
Beams, open hearth	12£ 2s. 6d.
Channels, open hearth	12£ 2s. 6d.
Angles, open hearth	12£ 2s. 6d.
Black sheets, No. 24	
gage	17£ max.*; 17£ min.**
Galvanized sheets, No. 24	
gage	19£ 10s. max.*; 19£ 10s. min.**

* Empire markets only.
** Other than Empire markets.

CONTINENTAL

Per Gross Ton, Belgian Francs

f.o.b. Continental Ports

Bars, merchant	1500
Plates	1750
Joists	1475
Sheets, thin	1300

Above price are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn City	26.50
Delivered Newark or Jersey City	25.52
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown..	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati	23.06
Northern, delivered, Cincinnati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.33

* Delivered prices on southern iron for shipment to northern points are 28c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown..	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	\$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown ..	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points; Birdsboro, Pa., Steelton, Pa., and Buffalo....\$28.50

Gray Forge

Valley or Pittsburgh furnace..\$22.50

Charcoal

Lake Superior furnace	\$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Foundry iron	\$27.50 base
Malleable	28.00 base
Basic	27.50 base

Toronto

Foundry Iron	\$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 1.25 per cent silicon and under is base. For each 35 cents of silicon over 1.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.	
Domestic, 80% (carload)	\$100.00

Spiegeleisen

Domestic, 19 to 21%	\$32.00
Domestic, 26 to 28%	\$39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	\$69.50*
50% (ton lots, packed)	\$2.90*
75% (carload lots, bulk)	\$126.00*
75% (ton lots, packed)	\$142.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

10.00 to 10.50%	\$32.50
For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.	
For each unit of manganese over 2%, \$1 per ton additional.	
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	\$27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.	
The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.	

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	\$11.00c.
2% carbon	17.50c.
1% carbon	18.50c.
0.10% carbon	20.50c.
0.06% carbon	21.00c.
Spot prices are 1/4c. per lb. of contained chromium higher.	

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	\$98.00*
2.50% carbon	103.00*
2% carbon	108.00*
1% carbon	118.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carload....	\$2.00
Ferrotungsten, 100 lbs. and less	2.25
Ferrovanadium, contract, per lb. contained V., delivered	\$2.70 to \$2.90†
Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	\$2.25†
Ferrocobaltitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	\$142.50
Ferrocobaltitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	\$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton	\$58.50
Ferrophosphorus, electrolytic 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville	\$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo. per lb. contained Mo. f.o.b. Langeloth, Pa.	80c.

* Spot prices are \$5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores Delivered Lower Lake Ports

Old range, bessemer, 51.50%	\$5.25
Old range, non-bessemer, 51.50%	5.10
Mesaba, bessemer, 51.50%	5.10
Mesaba, non-bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Algerian, low P, Cu free, dry, 55 to 58% Fe	14c.
Swedish, low P, 68% Fe	14c.
Swedish, basic or foundry, 65% Fe	12c.
Caucasian, washed, 52% Mn	Nom.
African, Indian, 44 to 48% Mn ..	46c.
African, Indian, 49 to 51% Mn ..	49c.
Brazilian, 46 to 48% Mn	47c.
Cuban, del'd, duty free, 51% Mn	62c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	\$23.00 to \$23.50
Tungsten, domestic scheelite delivered	23.00 to 23.50
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	\$19.00
Rhodesian, 45%	22.00
Rhodesian, 48%	26.00 to \$27.00
Turkish, 48-49%	29.00 to 30.00
Turkish, 45-46%	Nominal
Turkish, 40-41%	Nominal
Chrome concentrates c.i.f. Atlantic Seaboard, per gross ton:	
Turkish, 48-49%	Nominal

* All foreign ore prices are nominal.

FLUORSPAR

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	\$21.00
Domestic, f.o.b. Ohio River landing barges	21.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	\$20.00 to 22.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	\$25.00 to \$25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2 1/4% silicon, f.o.b. Illinois and Kentucky mines....	\$31.00
ditto, in bags, f.o.b., same mines	\$32.60

FUEL OIL

Per Gal.

No. 3, f.o.b. Bayonne, N. J.	5.10c.
No. 6, f.o.b. Bayonne, N. J.	3.57c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd.	5.25c.
No. 4 industrial, del'd Cleve'd.	5.00c.
No. 5 industrial, del'd Cleve'd.	4.25c.
No. 6 industrial, del'd Cleve'd.	3.875c.

COKE

Per Net Ton

Furnace, f.o.b. Connells-ville, Prompt	\$4.00 to \$4.25
Foundry, f.o.b. Connells-ville, Prompt	5.25 to 5.50
Foundry, by - product Chicago ovens	10.50
Foundry, by - product del'd New England....	12.50
Foundry, by - product del'd Newark or Jersey City	11.38 to 11.90
Foundry, by - product Philadelphia	11.13
Foundry, by - product delivered Cleveland ..	11.05
Foundry, by - product delivered Cincinnati ..	10.50
Foundry, Birmingham..	7.50
Foundry, by - product del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSES

PITTSBURGH*

	Base per Lb.
Plates	3.40c.
Shapes	3.40c.
Soft steel bars and small shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.75c.
Wire, black, soft annealed	3.30c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb. kegs)	2.80c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.
On reinforcing bars base applies to orders of less than one ton and includes switching and starting charge.
All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
*Plates, 1/4 in. and heavier	3.76c.
*Structural shapes	3.75c.
*Soft steel bars, round	3.84c.
Iron bars, Swed. char-coal	9.50c.
**Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.09c.
Flats up to 12 in. wide	4.09c.
Cold-rolled strip soft and quarter hard	3.51c.
*Hot-rolled strip, soft O.H.	3.96c.
*Hot-rolled sheets	3.43c.
Galv. sheets (24 ga.)	4.50c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.35c.
SAE, 3100, hot-rolled	5.90c.
SAE, 6100, hot-rolled annealed	8.75c.
SAE, 2300, cold-rolled	8.59c.
SAE, 3100, cold-rolled, annealed	8.19c.
*Floor plate, 1/4 in. and heavier	5.56c.
Standard tool steel	12.50c.
Wire, black, annealed	4.85c.
Wire, galv. (No. 9)	4.70c.
O. H. spring steel, flats	4.70c.
Common wire nails, per keg	\$2.85

*For lots 400 to 1999 lb.
**For lots less than 1500 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.50c.
Soft steel squares, hexagons, channels and Tees	3.65c.
Hot rolled strip	3.60c.
Floor plates	5.15c.
Hot rolled sheets	3.35c.
Galvanized sheets	4.60c.
Cold rolled sheets	4.30c.
Cold finished carbon bars	3.75c.
Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.	

CLEVELAND

	Base per Lb.
Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Cold-fin. bars (1500 lb., over.)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	4.05c.
Cold-finished strip	3.20c.
Galvanized sheets (No. 24)	4.72c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heavier	5.18c.
Black ann'l'd wire, per 100 lb.	\$3.10
No. 9 galv. wire, per 100 lb.	3.50
Com. wire nails, base per keg	2.75
Hot rolled alloy steel (3100)	5.85c.
Cold rolled alloy steel (3115)	6.75c.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lbs. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 400 to 1499 lb.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.47c.
Bars, soft steel (round and flats)	3.62c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.77c.
Cold fin. rounds, shafting, screw stock	4.02c.
Galv. sheets (24 ga.)	4.52c.
Hot rolled sheets	3.38c.
Galv. corrugated sheets, 24 ga. and heavier	4.57c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	3.85c.
Plates, 1/4 in. and heavier	3.85c.
Bars	3.88c.
Heavy hot rolled sheets	3.71c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.61c.
Galvanized sheets	4.61c.
Cold rolled sheets	4.71c.
The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb., plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.	

BUFFALO

	Base per Lb.
Plates	3.62c.
Floor plates	5.25c.
Struc. shapes	3.40c.
Soft steel bars	3.35c.
Reinforcing bars (20,000 lb. or more)	2.15c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes No. 8 to 30 ga.	3.35c.
Galv. sheets (24 ga.)	4.70c.
Bands and hoops	3.82c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	\$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (Eastern)	8.55

Chrome Brick

	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	\$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

Magnesite Brick

	Net per Ton
Standard f.o.b. Baltimore and Chester	\$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite

	Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

* None available.

PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	3.55c.
*Structural shapes	3.55c.
*Soft steel bars small shapes, iron bars (except bands)	3.85c.
†Reinforc. steel bars, square and deformed	2.76c.
Cold-finished steel bars	4.16c.
Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	3.85c.
*Spring steel	5.00c.
*Hot-rolled anneal. sheets	3.55c.
†Galvanized sheets (No. 24)	4.75c.
*Diam. pat. floor plates, 1/4 in.	5.25c.

*For quantities between 400 and 1999 lb.
†For 10 bundles or over.
‡For one to five tons.

BIRMINGHAM

	Base per Lb.
Bars and bar shapes	3.50c.
Structural shapes and plates	3.55c.
Hot rolled sheets No. 10 ga.	3.35c.
Galvanized sheets No. 24 ga.	4.75c.
Strip	3.60c.
Reinforcing bars	3.50c.
Floor plates	5.88
Cold finished bars	4.43
Machine and carriage bolts	50 & 10 off list
Rivets (structural)	\$4.60 base
On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant.	

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.35c.*	3.80c.	3.40c.
Shapes, standard	3.35c.*	3.80c.	3.50c.
Soft steel bars	3.50c.	3.50c.	4.00c.
Reinforcing bars, f.o.b. cars dock			
Pacific ports	2.525c. open.	2.975c.	
Hot-rolled sheets (No. 10)	3.40c.	4.10c.	3.70c.
Galv. sheets (No. 24 and lighter)	5.15c.	5.00c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.00c.	4.75c.
Cold-finished steel			
Rounds	6.80c.	6.60c.	7.00c.
Squares and hexagons	8.05c.	7.85c.	8.25c.
Flats	8.55c.	8.35c.	8.25c.
Common wire nails—base per keg less carload	3.25c.	3.25c.	3.25c.

* Plates over 1 in. and shapes over 6 in. are 25c. per 100 lb. higher.
All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

	Base per Lb.
Soft steel bars	4.43c.
Structural shapes	3.65c.
Plates	3.60c.
Floor plates	5.27c.
Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide	3.43c.
Cold-rolled sheets	4.50c.
*Galvanized sheets	4.84c.
Hot rolled strip, under 12 gage	3.63c.
Hot rolled strip, above 12 gage	3.43c.
Cold-finished bars	3.80c.
Cold-rolled strip	3.40c.
Hot-rolled alloy steel (SAE 3100 Series)	5.97c.
Cold-rolled alloy (SAE 2300)	8.45c.

Quantity extras apply to all items.
*Price applies only in metropolitan Detroit.

THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

... Foreign orders off slightly, but large foreign demand still pending ... Large tooling programs expected to follow placement of Allied plane and engine contracts, temporarily held up pending Congressional inquiry ... Domestic sales maintain level.

Easing of Foreign Orders; Inquiries Maintained

CINCINNATI—A small downward fluctuation in total machine tool bookings in the Cincinnati area was noted during the past week, but is believed to be a casual development. This moderate slackening was chiefly in the foreign demand, since builders generally report that domestic ordering is holding to previous levels, or in one or two instances has moderately improved. Market feeling continues to be good, since manufacturers report a large quantity of foreign ordering still in the offing, with domestic inquiries continuing in goodly number. In fact, domestic ordering has showed relatively no change throughout the current month, most of the fluctuations from week to week being recorded in the export business. No change is seen in the relative position of the various types of tools in consumer interest, milling machines, grinding machinery and lathes still apparently near the top, although other types of tools are correspondingly active. Drilling machinery which had heretofore been rather slow is maintaining its steady interest with no change in pace.

Shipping instructions still continue to be a matter of concern to local manufacturers, but there is not much they can do about it. Plants generally are running at capacity, although a margin of production still exists if the skilled labor could be found to take care of it.

Heavy Wartime Needs Still Overhang Market

CLEVELAND — The production pace continues unslackened here and additional heavy wartime requirements are reported overhanging the market. Purchase of 900 machines of one type alone is being talked about.

Pressure for priority in shipments is terrific despite the best efforts of the industry to satisfy the most necessary demands. Particular emphasis is noted on behalf of the aircraft industry, yet the confusion of engine, plane and parts makers is so great that it is difficult to make complete plans. Apparently, designs of motors and planes are changing so quickly that the Allies themselves cannot state what they want. Many machine tool producers are desirous of cooperating to the fullest extent, but are reluctant to undertake expansion on such an indefinite basis, particularly when obtaining their necessary new equipment would

serve to further complicate the delivery situation.

March Orders Show Gain in Chicago Area

CHICAGO—Local machine tool sales offices have been receiving a goodly number of orders, mostly for single machines. March to date is well ahead of February in dollar volume, and in units as well in some instances. New inquiries are fairly good, and are now in sufficient quantity and of such quality as to give sellers considerable hope for future sales. A new small-combine plant at East Moline, Ill., for International Harvester Co. will be erected soon, but much of the necessary machinery, mainly presses, conveyors, etc., has already been purchased. The Nash program for its Kenosha, Wis., plant is about completed. Much less was contracted for than was originally planned by the company. Orders and inquiries are coming from the arsenal at Rock Island regularly, even though the 1940 appropriation for this arsenal has not yet been approved by Washington.

Detroit Firm Buys for French Engine Production

DETROIT—Machinery Suppliers, Inc., the organization procuring equipment for European aircraft engine manufacture, continues an active program from its offices in the Graham plant. Supposedly all buying on the Rolls-Royce engine is completed, since the tool engineering and buying activities are now centered on tooling up for the Hispano-Suiza (French) engine. Other foreign buying spread out from Detroit includes the recently completed deal under which equipment will be manufactured in Germany for a continuous steel mill to be erected in Italy by Fiat, Italian automotive concern. Besides a moderate width rolling mill, there will be four open hearths, two of them of 100-ton capacity.

Programs for 1941 models are being pushed rapidly, Ford "six" buying being a highlight. But the new Pontiac light six, apparently a substitute for the present six-cylinder car, is also a live project. Dodge's transmission (vacuum-powered like Chevrolet's) is nearly cleaned up, with tentative production set at 75 an hour, curiously, the same as the initial rate set for the Ford six job.

Machine tool dealers and manufacturers in this area know that their crowded shop schedules and long delivery dates

have cost them some business, some of them having been turned down with their bids on most of the current auto projects. The auto manufacturers have not suffered, however; they merely turned to the second choice as a source of supply in some cases, and in other cases they rebuilt machinery to do next year's jobs.

Market Continues Spotty In the East

NEW YORK—For one dealer at least March will show an improvement in the volume of orders over February, but the general trend has been downward. The picture can change over night, however, since a large amount of potential buying on the part of the aircraft industry still overhangs the market. Clarification of the Allied aircraft purchasing program will undoubtedly follow the Congressional hearings to be held this week in Washington to determine the Administration's policy regarding the sale of late-model war planes to foreign nations. Placing of the billion dollar plane and engine contracts contemplated will release orders for millions of dollars worth of machine tools with which to build them.

Meanwhile, local demand has been a little more diversified. Among recent purchasers have been office equipment makers, sewing machine manufacturers and machine tool builders. The Navy figured in recent purchases, and one of the highest price single machines on record was sold to an arsenal.

Aluminum Prices Cut

PITTSBURGH—Effective March 25, Aluminum Co. of America reduced its price for aluminum ingot from 20c. a lb. to 19c. a lb. and adjusted prices downward on the majority of its fabricated products.

The reduction in the price of the metal was, according to Roy A. Hunt, president, in line with the company's promise made last November, when he said there would be no advance in the price of aluminum ingots during the first quarter of 1940 insofar as his company was concerned. He added at that time: "The benefits of research and development together with expansion of plants and facilities permit the company to expect lower costs. In line with its expressed policy, it intends to share such economies with the consumers of aluminum."

Midland Steel Addition

CLEVELAND — Midland Steel Products Co., West 106 Street and Madison Avenue, plans to add 5500 sq. ft. of manufacturing space in a brick and steel addition to be erected shortly. The structure is being designed by the company's engineering staff.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Bendix Aviation Corp., Pioneer Instrument Division, 30 Rockefeller Plaza, New York, aircraft instruments and parts, has approved plans for one-story addition to plant at Bendix, N. J. Cost over \$100,000 with equipment.

Certified Gauge & Instrument Co., 38-27 Thirtieth Street, Long Island City, has leased part of building of Maytag Atlantic Co., 34-18 Northern Boulevard, for plant.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until April 1 for 10,000 steps for galvanized steel poles (Circular 343); until April 5 for 259,000 ft. of telephone cable (Circular 331).

Simmons Machine Tool Corp., North Broadway, Albany, N. Y., plans one-story addition to plant in Menands district, 150 x 365 ft. Cost over \$60,000 with equipment.

Solvay Process Co., 40 Rector Street, New York, plans expansion and improvements in branch plant at Hopewell, Va., including one-story addition to ammonia division. Cost over \$85,000 with equipment.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until April 4 for malleable iron castings (Circular 526); until April 5, milling fixtures and drill jigs (Circular 524); until April 9, hydraulic honing machine (Circular 504).

Calco Chemical Division of American Cyanamid Co., 90 West Street, New York, has let general contract to Stearns Construction Co., Inc., 56 James Street, Montclair, N. J., for two-story addition to plant at Bound Brook, N. J., 150 x 700 ft., for storage and distribution. Cost over \$125,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 2 for angle relief valves, spare parts and tools (Schedule 1064) for Brooklyn and Philadelphia Navy yards; 10 semi-trailers, with platform bodies and upper fifth wheels (Schedule 1106), pressure grip, drive type lubricators, and aluminum-alloy body plug valves (Schedule 1100); until April 5, two emergency and port pumps, and two fire and bilge pumps (Schedule 1117), for Philadelphia yard.

Quartermaster, Fort H. G. Wright, N. Y., asks bids until April 4 for steel dowel pins, lead-covered cable, cable racks, cable reels, distribution boxes, etc. (Circular 971-28).

Flintkote Co., 50 West Fifth Street, New York, roll roofing, insulating products, etc., has let contract to Rust Engineering Co., Pittsburgh, and Martin Building, Birmingham, for branch mill near Meridian, Miss., where large tract recently was acquired, for production of insulating board. Main unit will be one-story, 300 x 1200 ft., with smaller structures, power house, machine shop and other mechanical units. Cost over \$1,500,000 with processing and other machinery, of which close to \$1,000,000 will be used for equipment.

Industrial Iron Works, Inc., 359 Van Horn Street, Jersey City, N. J., boilers, tanks, etc., has leased one-story building at 32-34 State Street, for plant.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until April 1 for 10 punch press guards (Circular 1271), hand-operated bending brake, 36½ in. bending capacity, 16-gage steel (Circular 1270), four cutting outfits, including cutting torches, etc. (Circular 1272), five rectifiers (Circular 1273).

Continental Distilling Corp., 1800 West Lehigh Avenue, Philadelphia, has let general contract to S. H. Levin, 1619 Sansom Street, for one-story addition to distilling plant on Bigler Street. Cost about \$40,000 with equipment.

Welch Aircraft Industries, Inc., South Bend, Ind., small type airplanes and parts, has

taken over part of former plant of Sheldon Axle Works, Wilkes-Barre, Pa., for new plant, pending construction of one-story works near Wilkes-Barre-Wyoming Valley airport at Forty Fort, on which erection will begin soon. Present plant is being removed from South Bend.

Quartermaster Depot, Twenty-first and Johnston Streets, Philadelphia, asks bids until April 3 for armored cable, expanded metal lath, switch boxes, connectors and other equipment (Circular 669-280).

◀ BUFFALO DISTRICT ▶

Curtiss Aeroplane Division, Curtiss-Wright Corp., Buffalo, plans steel hangar at municipal airport near plant, for assembling and other service. Cost over \$60,000 with equipment.

Hooker Electrochemical Co., Buffalo Avenue and Forty-seventh Street, Niagara Falls, N. Y., caustic soda, liquid chlorine, etc., has let general contract to C. C. Bremer & Co., 2576 Seneca Avenue, for one-story addition. Cost about \$45,000 with equipment.

Jamestown Metal Equipment Co., Inc., Blackstone Washing Machine Division, Allen Street, Jamestown, will ask bids on general contract late in spring on one-story plant, about 240 x 700 ft., for new main works for all production departments. Cost over \$265,000 with equipment. E. B. Card is company engineer.

◀ NEW ENGLAND ▶

United States Engineer Office, Providence, R. I., asks bids until April 3 for 6 x 12-ft. gates and accessory equipment for Birch Hill dam (Circular 270); until April 4, pumping station equipment, including pumps, engines, gear units and auxiliaries (Circular 274).

Coca-Cola Bottling Co., 466 Chapel Street, New Haven, Conn., has let general contract to Smith Construction Co., 101 Water Street, Derby, Conn., for one and two-story mechanical-bottling, storage and distributing plant. Cost close to \$200,000 with equipment. Jesse M. Shelton, Bona Allen Building, Atlanta, Ga., is architect and engineer.

Purchasing and Contracting Officer, Fort Ethan Allen, Vt., asks bids until April 6 for one portable pipe machine (Circular 107-20); until April 9, spindle floor shaper (Circular 107-21), both motor-driven.

Board of Education, Quincy, Mass., plans two-story and basement addition to trade and vocational school. Cost close to \$100,000 with equipment. Cram & Ferguson, 248 Boylston Street, Boston, are architects.

Commanding Officer, Ordnance Department, Watertown Arsenal, Watertown, Mass., asks bids until April 1 for one hydraulic type surface grinder (Circular 418); until April 15, two 24-in. heavy duty, precision lathes (Circular 417).

◀ WASHINGTON DIST. ▶

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until April 2 for five diesel engine units (Circular 398-171).

Civil Aeronautics Authority, New Commerce Building, Washington, asks bids until April 1 for 20 towers, insulated antenna, with steel base, ladder, counterpoise, insulators, etc. (Circular 375); until April 9 for 25 to 150 towers, insulated antenna, with steel base, ladders, counterpoise and accessory equipment (Circular 364).

General Purchasing Officer, Panama Canal, Washington, asks bids until April 1 for bridge and hand reamers, machinist's, bench and pipe vises, sledge and machinist's hammers, pipe and monkey wrenches, combination pliers,

ship scrapers, hand-power bench grinders, crosscut saws, compass saws and other tools (Schedule 3953), motor-generator set, with control equipment (Schedule 3966); until April 4, lead-coated copper annealed cable, copper cable taps, test switches, etc. (Schedule 3962); until April 5, drilling machine, brake drum lathe and grinder, engine lathe, welding machine and accessories, all motor-driven; one hydraulic elevator, automatic lift of 7500-lb., combination valve refacer and valve seat grinder (Schedule 3965).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 2 for two motor-driven precision toolmaker's lathes (Schedule 1059) for Norfolk, Va., Navy Yard; about 8000 ball bearings (Schedule 1093) for Newport, R. I., Naval Air Station; aluminum cartridge containers (Schedule 1094) for Portsmouth, Va., Hingham, Mass., and Iona Island, N. Y.; motor-driven, single-spindle woodworking shaper (Schedule 1081) for Carderock, Md.; until April 5, for 120,000 ft. of tinned steel cable (Schedule 1076) for Philadelphia and San Diego yards.

◀ SOUTH ATLANTIC ▶

Pepsi-Cola Bottling Co., Miami, Fla., plans one-story mechanical-bottling plant on N. W. Thirty-sixth Street, 80 x 120 ft. Cost about \$45,000 with equipment. W. T. Efting, 5150 N. W. Twenty-second Avenue, is engineer.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for three 150-ft. steel radio towers for Naval Air Station, Jacksonville, Fla. (Specifications 9516); also bids (no closing date stated) for fuel oil tank, oil and steam piping, and pumping unit with accessories, same station (Specifications 9518).

Board of City Commissioners, Jacksonville, Fla., asks bids until April 2 for extensions and improvements in overhead electrical distributing system (Section 13), and additions and improvements in underground system (Section 15). Appropriations of \$75,000 and \$225,000 have been authorized for work, in order noted.

◀ SOUTH CENTRAL ▶

Wackman Welded Ware Co., 2412 South Seventh Street, St. Louis, steel drums, tanks, barrels, etc., has let general contract to T. Miller & Sons Co., Lake Charles, La., for branch plant at Lake Charles, comprising three one-story buildings. Cost over \$85,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until April 9 for welded steel gate anchorages for spillway at Watts Bar dam; until April 8 for fabricating steel re-cess frames, covers and grating support framing for Kentucky lock, totaling about 27 tons of steel.

City Council, Kosciusko, Miss., has plans for extensions and improvements in municipal light and power plant and waterworks station, including additional equipment. Bond issue of \$70,000 has been authorized.

◀ SOUTHWEST ▶

Columbia Brewing Co., 2000 Madison Street, St. Louis, has asked bids on general contract for two-story addition for storage and distribution, 105 x 120 ft. Cost over \$65,000 with equipment. Janssen & Janssen, Chemical Building, are architects.

Wichita Flour Mills Co., 701 East Seventeenth Street, Wichita, Kan., has let general contract to Bushman Construction Co., St. Joseph, Mo., for new headhouse at mill, with capacity of about 200,000 bu. Cost close to \$100,000 with equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Union Electric Co. of Missouri, 315 North Twelfth Boulevard, St. Louis, has approved plans for expansion and improvements in steam-electric generating plant at Main and Ashley Streets. Cost over \$200,000 with equipment.

Purchasing and Contracting Officer, Normoyle Quartermaster Depot, San Antonio, Tex., asks bids until April 10 for cast iron,

malleable iron or cast steel wheels (Circular 632-11).

Coca-Cola Bottling Co., Beaumont, Tex., has asked bids on general contract for one-story branch plant at Silsbee, Tex., for storage and distribution. Cost close to \$45,000 with equipment. Stone & Pitts, Goodhue Building, Beaumont, are architects.

J. A. Folger & Co., 235 North Norwood Street, Houston, Tex., food products, have let general contract to Sam D. Cook, 6418 Esperon Street, for three-story addition, 60 x 120 ft., for coffee roasting and blending plant. Cost over \$75,000 with equipment. Robert J. Cummins, Bankers' Mortgage Building, is consulting engineer.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Brown, Tex., asks bids

until April 5 for one 5-ton road roller (Circular 164-40).

◀ WESTERN PA. DIST. ▶

Stackpole Carbon Co., Tannery Street, St. Marys, Pa., welding carbons and other carbon products, plans three one-story additions, 60 x 100 ft., 40 x 50 ft., and 35 x 50 ft. Cost close to \$65,000 with equipment.

Standard Can Co., Pittsburgh, recently organized by P. W. Hatfield and associates, has leased space in building on Columbus Avenue, Northside, for production of steel pails and cans for paints, oils and kindred products. Pittsburgh Commission for Industrial Expansion, First National Bank Building, has information regarding project.

Crew-Levick Co., Titusville, Pa., has plans for expansion and improvements in oil refinery at East Titusville, including equipment for increased capacity in gasoline and lubricating oil departments, and new dewaxing plant. Cost over \$65,000 with equipment.

◀ OHIO AND INDIANA ▶

William Powell Co., 2325 Spring Grove Avenue, Cincinnati, valves and other engineering specialties, has asked bids on general contract for two-story top addition to present three-story plant, 70 x 120 ft. Cost over \$70,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Apex Machine & Tool Co., 501 East Third Street, Dayton, Ohio, plans one-story addition. Cost over \$40,000 with equipment. Geyer & Nueffer, Ludlow Arcade Building, are architects.

Towmotor Co., 1226 East 152nd Street, N. E., Cleveland, industrial trucks and tractors, and parts, has let general contract to Peck & Udell Construction Co., 2341 Carnegie Avenue, for one-story addition, 41 x 94 ft. Cost close to \$40,000 with equipment.

General Machinery Corp., Hamilton, Ohio, machine tools and parts, has let general contract to A. Benzinger & Son, Hamilton, for three-story addition, and improvements in present plant. Cost over \$85,000 with equipment.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 1 for one shaper, two bench lathes, one tool room lathe, metal bandsaw, pan or box brake, counter saw, all motor-driven, and one foot-power shear (Circular 1227); three hydraulic pumps, valves, etc. (Circular 1238); until April 2, 70 emergency, portable starter assemblies (Circular 1231); until April 3, galvanized conduit, lead-covered cable, nipples, bushings, couplings, gaskets, etc. (Circular 1246); until April 4, oil tank assemblies (Circular 1241); two electric motors, relay heaters, starters, etc. (Circular 1247); until April 5, hydraulic fuel gage indicator assemblies, electric fuel gage indicator assembly, electric tank units, bushings, cams, springs, rings, ball bearings, etc. (Circular 1233); until April 8, 14,000 ft. of steel tape armored parkway cable (Circular 1250); until April 9, 35 oil-servicing trucks, three gasoline engines, three electric power plants, valves, clutch reductions, etc. (Circular 1228).

Noblitt-Sparks Industries, Inc., Seventeenth Street, Columbus, Ind., radio equipment and parts, automobile heaters, etc., plans two one-story additions, for expansion in metal-stamping division and for storage and distribution respectively. Cost over \$65,000 with equipment, work to be carried out during summer.

◀ MIDDLE WEST ▶

Garden City Plating & Mfg. Co., 1430 South Talman Avenue, Chicago, lighting reflectors, etc., has asked bids on general contract for one-story addition. Cost close to \$40,000 with equipment. Himelblau & Spits, 220 South State Street, are architects.

Goodrich Electric Co., 2901 North Oakley Avenue, Chicago, electrical products, plans one-story addition and improvements in present plant. Cost about \$50,000 with equipment. Alfred Alschuler, Inc., 28 East Jackson Boulevard, is architect.

Swift & Co., Union Stock Yards, Chicago, Soy Bean Division, plan expansion in branch mill at Champaign, Ill., including three additional soy bean oil presses and auxiliary equipment, 12 additional storage bins with mechanical-handling equipment, and other facilities. Cost over \$200,000 with equipment.

Hudson & Sharp Machine Co., Main Street, Green Bay, Wis., machinery and parts, has asked bids on general contract for one-story addition, 108 x 120 ft. Cost close to \$50,000 with equipment.

Town Council, McGregor, Iowa, asks bids until April 10 for new municipal power plant, including two diesel engine units and accessories, capacity 650 to 750-hp., with generators, switchboard and auxiliary equipment;

PUBLIC SALE..

IMPROVED INDUSTRIAL PROPERTY

BY ORDER of the United States District Court the balance of the real-estate of the Grigsby-Grunow Company, Bankrupt, will be offered for sale, free and clear of all liens, taxes, etc., to the highest and best bidder for cash on

Monday morning, April 8th, 1940 at 11:00 A.M. in the Court Room of Referee in Bankruptcy, Wallace Streeter, Room 1802, 7 South Dearborn Street, Chicago, Illinois.

● The property consists of approximately 400,000 square feet of fine industrial buildings, and 100,000 square feet of vacant property all facing on Dickens Avenue and running from Mango Avenue on the East to Austin Avenue on the West, and having complete switch track facilities connecting with the C.M. St. P. & P. R.R.

● The property will be sold as a whole or in separate units — one unit consisting of a modern power plant now being operated by the Trustee in supplying steam to various tenants and users under metered heat and power contracts.

● The Court reserves the right to accept or reject any or all bids.

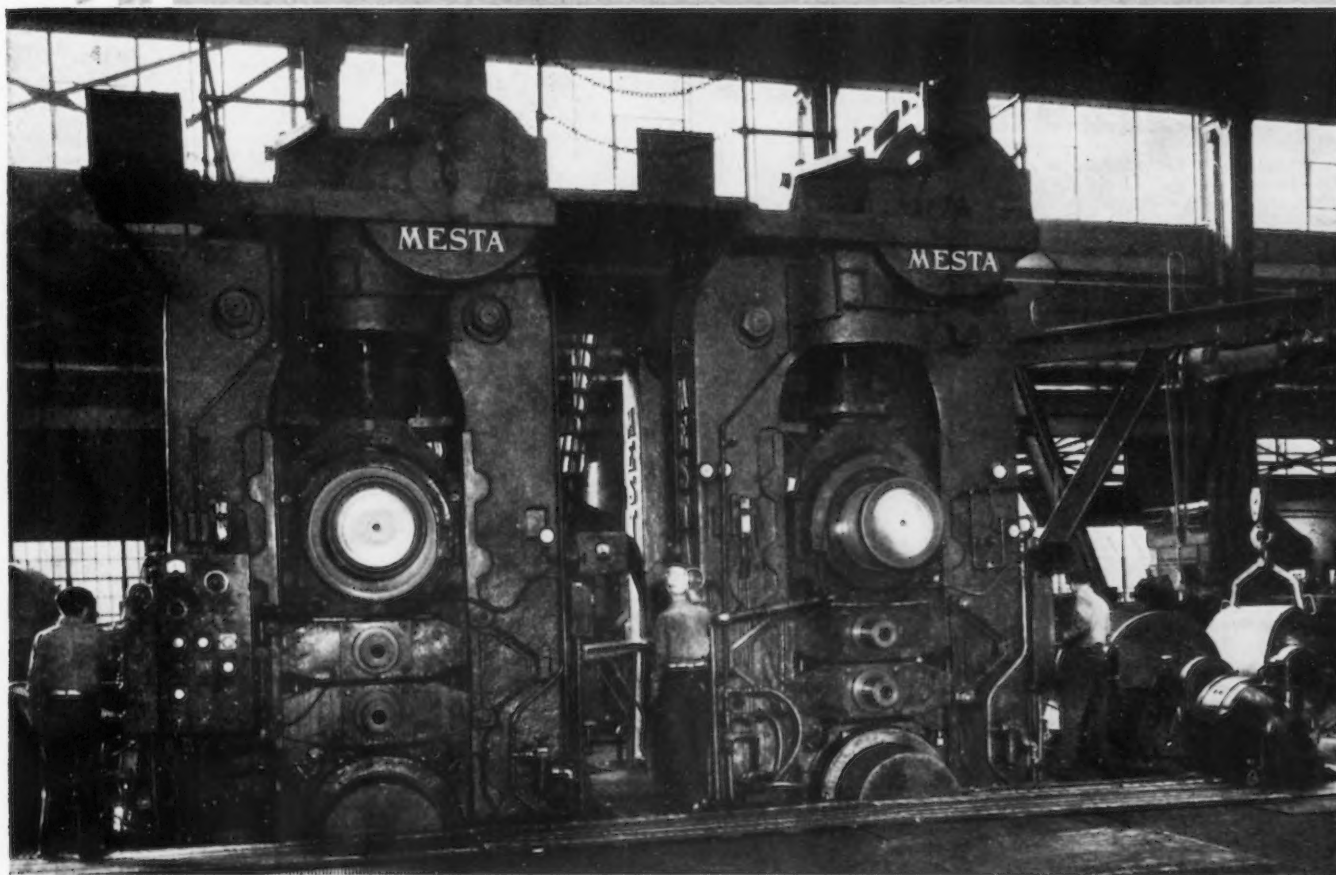
● Prospective buyers can go direct to the plants to inspect same, where they will find a representative of the Trustee, from 9 A.M. to 4 P.M. on week days and 9 A.M. to 1 P.M. on Saturdays. Office at plant, 5801 Dickens Avenue. Telephone: BERKSHIRE 1600. Further information can be obtained by writing to or calling on the undersigned Trustee.

FRANK M. McKEY

Trustee in Bankruptcy of **GRIGSBY-GRUNOW COMPANY**
1615 First National Bank Bldg., Chicago • Telephone RAN. 2371

MESTA

. . . FOUR HIGH TWIN STAND
SKIN PASS MILLS FOR TIN PLATE



MESTA MACHINE COMPANY
PITTSBURGH, PA.

also for municipal distribution system. Cost about \$120,000. Stanley Engineering Co., Central State Bank Building, Muscatine, Iowa, is consulting engineer.

All-Steel Equip Co., Griffith Avenue, Aurora, Ill., steel lockers, cabinets, etc., has let general contract to Austin Co., Cleveland, for two-story addition, for storage and distribution. Cost about \$40,000 with equipment.

◀ MICHIGAN DISTRICT ▶

Brunswick-Balke-Collender Co., Muskegon, Mich., pool tables, bowling alleys, radio apparatus, etc., plans expansion and improvements in plant, including equipment. Cost about \$100,000 with machinery. Main offices are in Chicago.

Ford Motor Co., Dearborn, Mich., plans one-story addition to branch assembling plant at Dallas, Tex., 300 x 375 ft. Cost over \$250,000 with equipment. Albert Kahn, Inc., Detroit, is architect and engineer.

Schmidt Brewing Co., 1995 Wilkins Street, Detroit, has let general contract to George W. Auch Co., 3646 Mount Elliott Avenue, for one-story addition for expansion in mechanical-bottling division. Cost over \$40,000 with equipment. Harley & Ellington, Stroh Building, are architects.

Michigan Body Co., 2210 St. Aubin Avenue, Detroit, automobile bodies, plans one-story addition. Cost close to \$40,000 with equipment. H. E. Klei, 3231 West Davison Street, is architect.

◀ PACIFIC COAST ▶

General Motors Corp., Detroit, has let general contract to Lindgren & Swinerton, 605 West Olympic Boulevard, Los Angeles, for one-story addition to branch assembling plant at South Gate, Los Angeles, 150 x 900 ft., for storage and distribution. Cost about \$200,000 with equipment. Albert Kahn, Inc., Detroit, is architect and engineer.

Phillips Aviation Co., Metropolitan Airport, Van Nuys, near Los Angeles, airplane parts and equipment, has acquired aircraft engine division of Glenn L. Martin Co., Baltimore, and will remove to local plant where new department will be established for parts production and assembling.

Gas Department, Long Beach, Cal., plans two-story equipment storage and distributing building, with shop and repair facilities, 70 x 200 ft., on West Seventh Street. Cost about \$65,000 with equipment. Kenneth S. Wing, 501 Termino Avenue, is architect.

Signal Officer, Air Corps, Seattle, asks bids until April 8 for one 5-kw. diesel electric power plant (Circular 938-7).

City Manager, Burbank, Cal., asks bids until April 9 for four closed-type boiler feed-water heaters, one deaerating heater, and one evaporator with accessories, for municipal steam-electric generating plant (Specifications 207).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 2 for four stock anchors, each 1000 lb. (Schedule 1099); until April 5, expanded metal, galvanized steel (Schedule 1068), turning block (Schedule 1048); until April 9, copper-nickel-alloy tubing (Schedule 1087) for Puget Sound Navy Yard; motor-driven, hollow chisel mortising machine, vertical foot-pedal feed, with equipment and spare parts (Schedule 1083); until April 5, motor-driven engraving machine (Schedule 1052) for Mare Island yard; two 1000 to 2000-lb. electric cranes, without batteries (Schedule 1077) for Thorne, Nev.; until April 12, 700 single-deck and 300 double-deck steel bunks (Schedule 1112) for Alameda, Cal.

◀ CANADA ▶

British Columbia Mfg. Co., New Westminster, B. C., will start work immediately on rebuilding mill and veneer plant recently destroyed by fire, with loss of \$250,000.

War Supply Board, Ottawa, has awarded contract to Smith Brothers & Wilson, Ltd., 1267 Richards Street, Vancouver, B. C., for

stores and marine buildings at Royal Canadian Air Force Station, Jericho Beach, Vancouver.

Howard Smith Paper Mills, Ltd., 407 McGill Street, Montreal, has awarded contract to Fraser Brace Engineering Co., Ltd., 107 Craig Street West, for plant addition at Cornwall, Ont. Unloading equipment will be supplied by Dominion Bridge Co., Ltd., Lachine. Company will purchase pulpwood conveyor of overhanging type, operating from 190 ft. track with derrick-like carriage and 78 ft. hoist.

Canadian Oil Companies, Ltd., Petrolia, Ont., will start work at once on plant expansion to cost \$500,000. Topping and cracking units will be remodeled. Universal Oil Products Co., Chicago, Ill., will supervise work.

McKinnon Industries, Ltd., St. Catharines, Ont., is asking for tenders for plant addition, for which equipment will be purchased later.

War Supply Board, Ottawa, will start erection at once on seven hangars, repair depot and several dormitories at Royal Canadian Air Force station, Trenton, Ont., to cost \$300,000.

Massey-Harris Co., Ltd., Toronto, is calling for tenders for rehabilitating and erecting of an addition to plant at Weston, Ont. Plant, formerly used for production of tractors, has been idle for several years.

North Star Oil, Ltd., Scott Block, Winnipeg, Man., has awarded contract to Born Engineering Co., Tulsa, Okla., for erection of a cracking unit, tower and lines, in connection with \$300,000 expansion program at St. Boniface, Man.

Canadian Associated Aircraft, Ltd., 1050 Beaver Hall Hill, Montreal, will start work immediately on two-story addition to airplane plant at Malton, Ont. T. Pringle & Son, 36 Toronto Street, Toronto, are engineers.

Canadian Industries, Ltd., New Toronto, Ont., will build plant addition to cost \$50,000.

Schultz Die Casting Co., Wallaceburg, Ont., has plans by J. Mathven, 92 King Street West, for a plant addition.

Dominion Department of Public Works, Ottawa, Ont., has awarded contract to Brookfield Construction Co., Ltd., 169 Hollis Street, Halifax, N. S., for construction of torpedo building at Halifax.

Dunlop Tire & Rubber Goods Co., Ltd., Queen Street and Booth Avenue, Toronto, will build plant addition to cost \$50,000.

◀ FOREIGN ▶

Crompton Parkinson Australia Pty., Ltd., Sydney, New South Wales, Australia, electrical products, plans one-story addition for manufacture of fractional-horsepower motors, including parts and assembling departments. Cost over \$500,000 with equipment. Company also plans other expansion in production divisions with equipment. Capitalization recently has been increased from £33,000 to £200,000 for general expansion. Company is a subsidiary of Crompton Parkinson, Ltd., Leeds, England.

Ministry of Communications, Government of Mexico, Mexico, D.F., has authorized plans for refinery to handle industrial salts and certain chemicals now being extracted from lands under development by Government at Lake Texcoco, a dry area at Texcoco, about 50 miles from Mexico City. Plant will comprise one and multi-story units to cost close to \$700,000 with equipment. Work is scheduled to begin in fall.

Rolling of Sheet and Strip

(CONCLUDED FROM PAGE 27)

strains (as previously mentioned) and on the temper of strips. The more uniform the rolling procedure, the more the variations in properties produced by rolling should approach the changes derived from the same amount of stretching in tension. However, the combined effect of roll size, roll sur-

face, lubrication, reduction, speed, front and back tension, actual rolling temperature, etc., in temper rolling is very complex and cannot be predicted at the present time.

The properties of sheet vary often in different directions. This causes "earring" in deep drawing (Fig. 6), and is mainly due to a preferred orientation of the crystals. Out-of-flatness of sheet and strip can be permitted to a limited extent. Flat stock of a given metal can only be obtained by carefully adjusting the sequence of reductions and the crown of the rolls, according to the temper, thickness and crown of the stock. The actual temperature of the rolls during rolling is another important factor, and the cooling must be as uniform as possible to avoid streaks of small waves.

Ed. Note:—Next week the author concludes with detailed calculations on stress-strain relations involved in rolling.

Electric Industrial Truck Sales Gain in February

THE Industrial Truck Statistical Association, 200 South La Salle Street, Chicago, has begun the collection of sales statistics in the electric industrial truck field, which includes platform trucks, crane trucks, tractors and cantilever trucks. Total sales in January were \$273,383.25, over which a gain was shown in February to \$288,820. Walter S. McCann is secretary of the association.

January Manganese Ore Imports 80,537 Tons

JANUARY imports for consumption of manganese ore containing 35 per cent or more manganese were 80,537 long tons containing 39,409 tons of manganese, according to the Bureau of Foreign and Domestic Commerce. Of the imports in January, the U.S.S.R. supplied 44 per cent, the Gold Coast supplied 22 per cent, Brazil 15 per cent, Cuba 7 per cent, British India 7 per cent, and the Philippine Islands 5 per cent.

For 1939, imports for consumption were 627,129 long tons containing 313,810 tons of manganese, of which the Gold Coast supplied 39 per cent, the U.S.S.R. 21 per cent, Cuba 17 per cent, British India 14 per cent, and Brazil 7 per cent. In addition, 30,684 tons containing 8,898 tons of manganese (29 per cent Mn.) were entered from the Union of South Africa.

THE

MARCH 28, 1940

MAR 28 1940

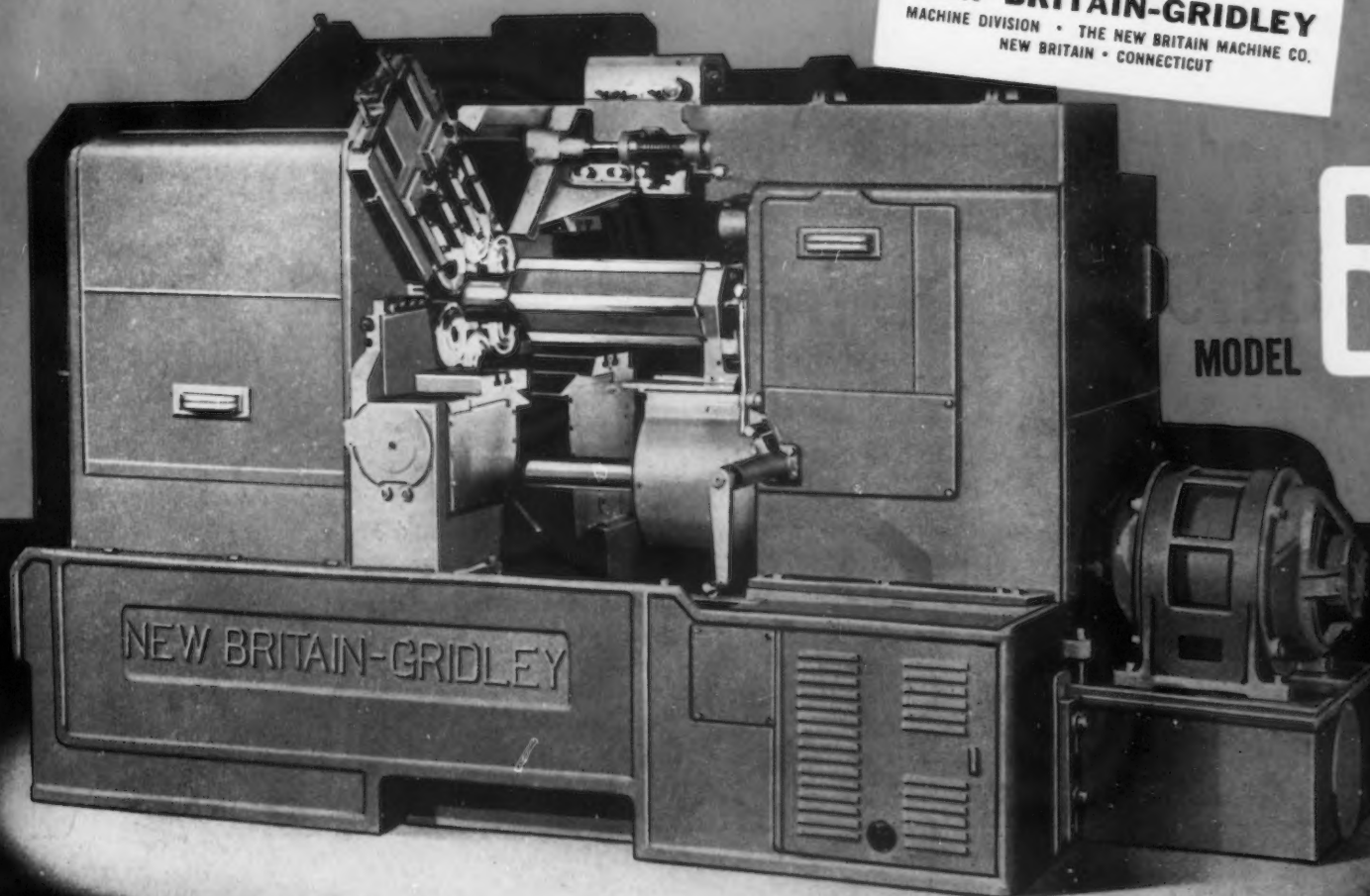
IRON AGE

*Outstanding
in Performance*

The present day trend of production methods, being more than ever toward closer tolerances while reducing costs, makes it extremely important that you consider New Britain Automatics first in buying new equipment. The entire New Britain line is designed for, — and incorporates Exclusive Features for, — Permanent Accuracy, as well as providing ease of set-up, ample rigidity for toughest cuts, and tool set-ups engineered to utilize the maximum efficiency of modern cutting tools.

NEW BRITAIN-GRIDLEY

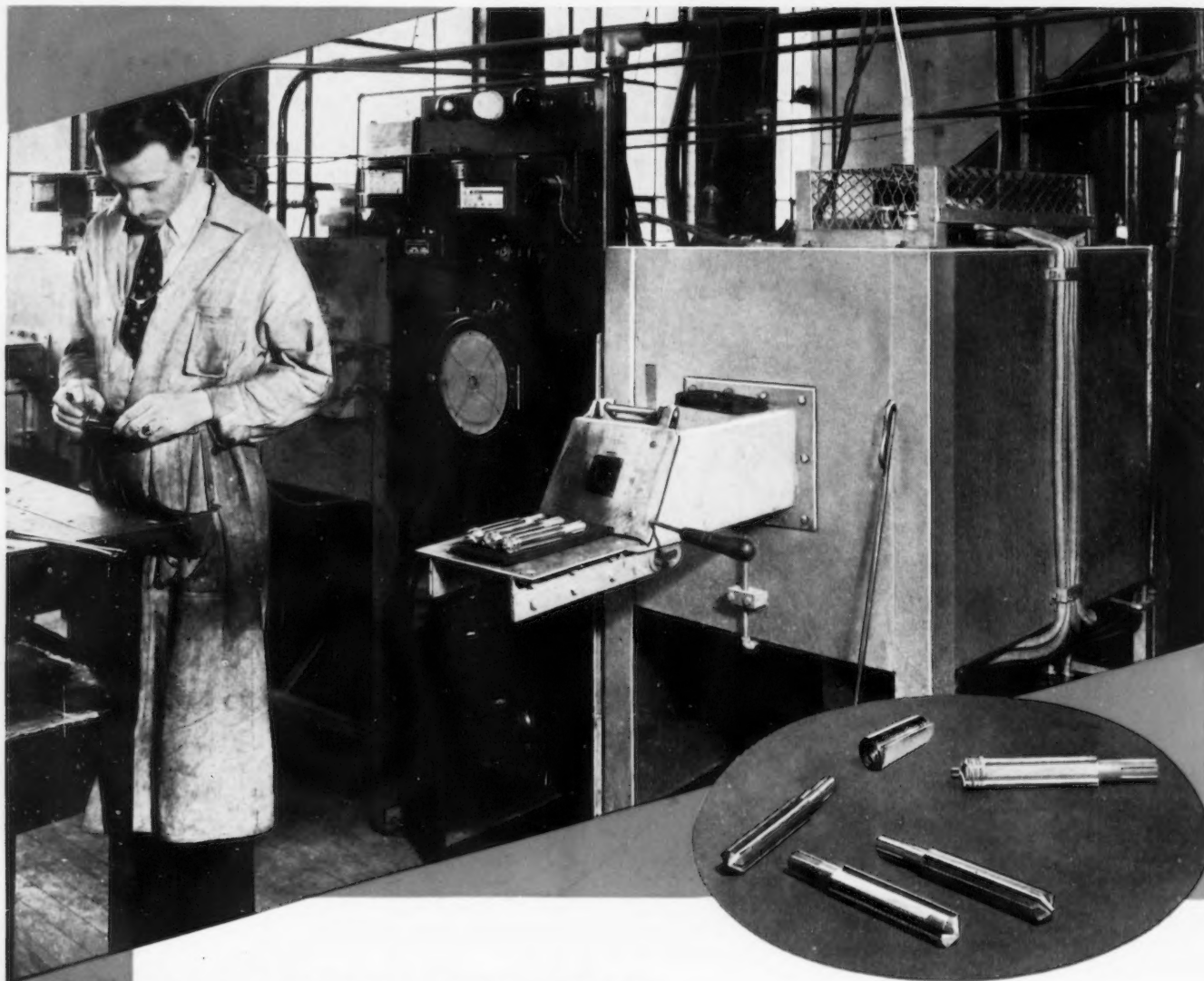
MACHINE DIVISION • THE NEW BRITAIN MACHINE CO.
NEW BRITAIN • CONNECTICUT



MODEL

61

A complete line of Screw Machines — Four and Six Spindles to 2 1/4" Capacity
Also a complete line of Chuckers — Four, Six and Eight Spindles to 10 1/4" Capacity



HOW MICHIGAN TOOL GETS GOOD BRAZING

The Michigan Tool Co. uses two Hoskins Brazing Furnaces for copper brazing tungsten carbide inserts with tool steel. They tell us they get a fine job of brazing. These furnaces are not large, are economical on power, and on hydrogen consumption. On this job each furnace runs at around 2100° F. and is rated at 12½ K.W. and each consumes in the neighbor-

These reamers are typical of the brazed carbide tools made by Michigan Tool Co.

hood of one tank (220 cu. ft.) of hydrogen in an 8-hour day. The hydrogen consumption varies, of course, with the frequency with which the doors are opened. The heating chamber, in Hoskins Brazing Furnaces, is 6½" wide x 5" (or less) high; the length is whatever may be required. The Chromel ribbon elements are extremely durable and easy to renew. If you do any brazing of small parts, you should send for folder that describes this equipment in detail. Hoskins Manufacturing Co., Detroit, Michigan.

HOSKINS PRODUCTS

ELECTRIC HEAT TREATING FURNACES • HEATING ELEMENT ALLOYS • THERMOCOUPLE AND LEAD WIRE • PYROMETERS • WELDING WIRE • HEAT RESISTANT CASTINGS • ENAMELING FIXTURES • SPARK PLUG ELECTRODE WIRE • SPECIAL ALLOYS OF NICKEL • PROTECTION TUBES



2—THE IRON AGE, March 28, 1940

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Publication office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 239 W. 39th St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. \$6.00 a year in U. S.; Canada \$8.50, Foreign \$12.00. Vol. 145, No. 13.

8 SUGGESTIONS for HARDENING TOOL STEEL



THE following suggestions have been thoroughly tried and proved. They are offered as a basis for obtaining the best possible results in hardening tool steel:

1. All grades of tool steel should be heated slowly and uniformly. Preheating in a separate furnace or chamber prior to charging into the hardening furnace is advisable, especially if the hardening temperature is 1800 deg. F. or over. This practice reduces scaling and decarburization.

2. After the tool has been transferred to the hardening furnace it should be brought rapidly to proper hardening temperature and quenched. Overheating, or holding the steel too long at quenching temperature, results in grain growth.

3. Small or intricately shaped tools should be hardened in the lower part of the hardening range; larger tools in the higher part of the range. Always use the lowest hardening temperature that will effectively harden the piece.

4. The use of salt or lead baths reduces the required heating time by approximately one half. The tool, however, should be warmed prior to immersing in such mediums.

5. Brine is a more reliable and effective quenching medium than water because it reduces the effect of steam bubbles on the quenched part.

6. When hardening differentially, avoid a sharp line of demarcation between hard and soft sections. Arrange the quenching apparatus so that a uniformly strong flow of quenching medium washes over the sections to be more deeply hardened.

7. To avoid surface deterioration during hardening, pack the tool in a container with cast iron chips, sand or partially spent carburizing material.

8. After a tool has been removed from the quenching medium, begin the tempering operation immediately to relieve cooling stresses.

Bethlehem furnishes tool steel to fit every type of metal working job. Carbon and Carbon Vanadium . . . High Speed Cutting and Finishing . . . Hot Work . . . Die and Non-Deforming . . . Shock Resisting . . . and Special Tool Steels. A Bethlehem engineer will be glad to help you choose the grade best suited to your needs. To call on him involves no obligation.



BETHLEHEM STEEL COMPANY



Close fitting...free acting
...continuous hinges are
produced at low cost on
Cincinnati Press Brakes.



THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

Here
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YOU PAY LESS FOR PUMPING WITH ALLIS-CHALMERS PUMPS!

Here Are Only a Few of the Thousands of Plants that have Modernized Their Pumping Service with Allis-Chalmers Pumps . . . Are Now Actually Getting More Water at Less Cost!

TODAY, Allis-Chalmers SSUnit Centrifugal Pumps are making NEWS with their extra-value, money-saving performance!

For in these new, modern industrial pumps you'll find compact, husky design that cuts maintenance costs and beats space and power waste. Bronze construction of enclosed runner, wearing rings and shaft sleeves protects you against excessive wear and rust, and assures long life.

And don't forget — there's a *right* type and a *right* size of pump in the Allis-Chalmers line that exactly suits your needs . . . helps *you* get more gallons at less cost!

The Allis-Chalmers representative in the district office near you has facts about how these pumps can save you money in your plant. Get in touch with him . . . today!

A 1211

BEATS A SPACE PROBLEM!

Proving its money-saving value in a large midwestern brewery, this Allis-Chalmers SSUnit Centrifugal Pump is beating a serious space problem . . . and at the same time lowering pumping costs.

PAYS FOR ITSELF IN 8 MONTHS!

This Allis-Chalmers Centrifugal Pump with 25 hp Maintenance Motor is bringing a power savings of \$6.48 per day to a northern paper company . . . actually paying for itself in eight months!

MORE GALLONS AT LESS COST!

Pumping brine in the refrigerating system of a large county institution, these SSUnit Pumps are giving a record-making performance of pumping more gallons . . . at less cost.



*Over 90 Years of Engineering
Superiority Work for You When
You Specify Allis-Chalmers!*

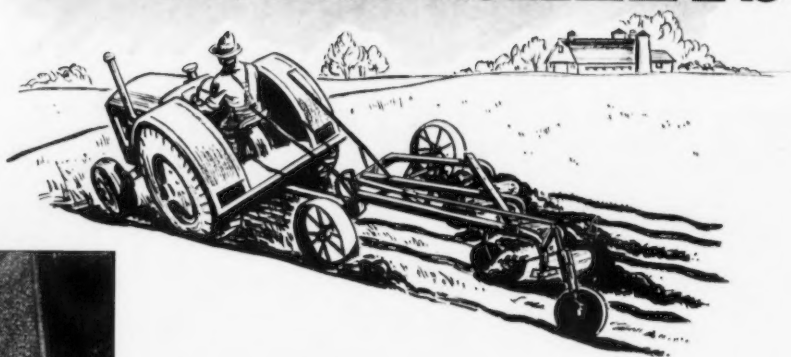


ALLIS-CHALMERS

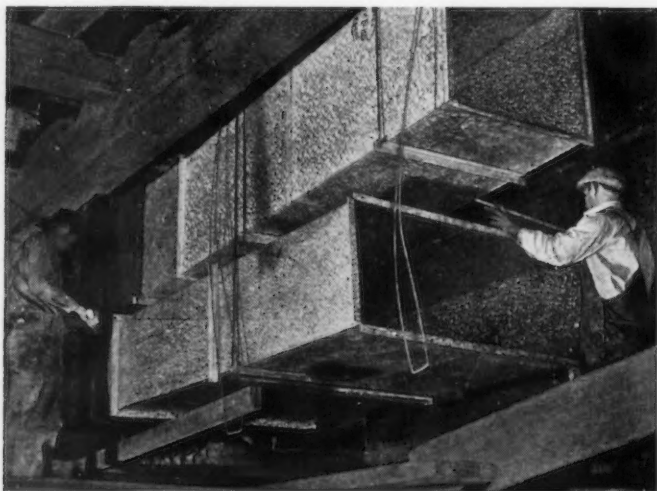
MILWAUKEE · WISCONSIN

Why these four manufacturers specify **BETHLEHEM** **STEEL SHEETS**

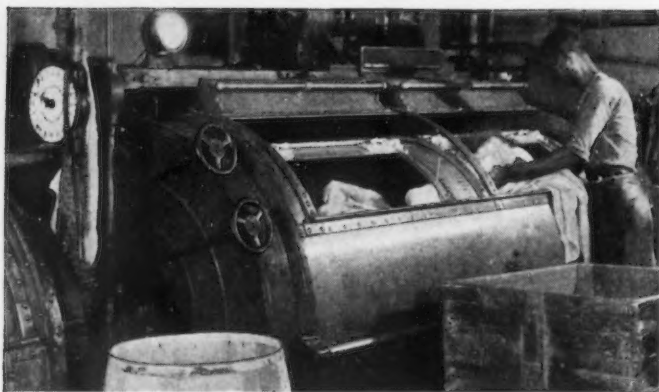
HERE are the reasons why four manufacturers of metal products, each using a different grade of steel, have standardized on Bethlehem Steel Sheets, black and galvanized.



A MAKER OF PLOWS uses heavy gage sheets for moldboards on the lighter models of his plows. He orders Bethlehem Steel Sheets because their uniformity helps keep production flowing smoothly.



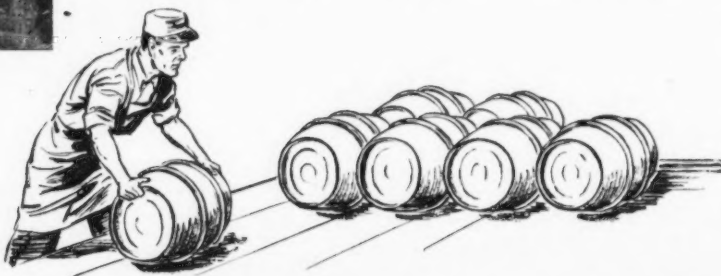
A COMPANY specializing in gas cleaning and air conditioning equipment uses Beth-Cu-Loy Steel Sheets, because these copper-bearing sheets provide maximum protection against corrosion at minimum cost.



A MANUFACTURER of laundry tubs specifies Bethlehem Galvanized Steel Sheets because these sheets have the tight zinc coating and good forming qualities required for efficient production.

A COMPANY making steel barrels and drums has standardized on Bethlehem Hot Rolled Steel Sheets, because their uniform temper permits fabricating economies in flanging, forming, welding and other operations.

THERE is a grade and gage of Bethlehem Steel Sheets that will exactly meet your requirements. A trial on a production run in your plant will show you that they are easy to form, ductile, uniform in shipment after shipment. And you may be pleasantly surprised at the way fabricating costs drop when you standardize on Bethlehem Steel Sheets, black or galvanized.



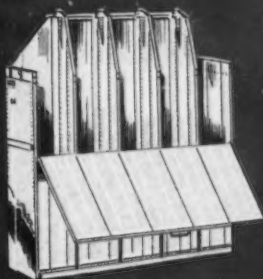
BETHLEHEM STEEL COMPANY



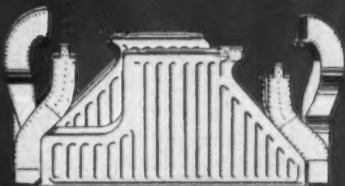
STAINLESS STEEL *in Military Aircraft*



This aileron for a Seversky P-35 pursuit plane of the type shown at the right is a light, strong structure of spot-welded 18-8 stainless steel.



Stainless steel provides these bomb chutes with smooth, corrosion-resistant surfaces which resist the wear of fast moving projectiles.



Corrosion cannot interfere with the operation of these stainless steel ammunition chutes because the rust-free surfaces will remain smooth.

DESIGNERS and manufacturers of military aircraft find stainless steel an ideal material for an increasing number of applications. A few such applications already common on military planes are illustrated. Consider these four inherent advantages of stainless steel and what they mean to you:

1. **Excellent Strength-Weight Ratio**—compares favorably with other commonly used materials. *Result:* Strength with light weight . . . greater fuel capacity . . . longer cruising range.
2. **Ease of Fabrication**—by modern, high-speed welding processes. *Result:* Faster production . . . smoother surfaces . . . less drag . . . higher speeds.
3. **Corrosion Resistance**—immune to atmospheric corrosion. *Result:* No painting . . . faster production . . . less maintenance. No corrosion losses . . . lighter sections . . . less dead load.
4. **Strength at High Temperatures**—up to 1650 deg. F. *Result:* Resists hot, corrosive gases and abrasion . . . longer life . . . increased dependability. Fireproof . . . greater safety.

We do not make steel, but for over thirty years we have produced "Electromet" ferro-alloys used in making steel. The fund of data on stainless and other alloy steels thus accumulated and the assistance of our metallurgists are available without obligation. A request on your letterhead will bring the book, "Stainless Steel in Aircraft," which describes more fully the advantages of this versatile metal in the aircraft industry. Electro Metallurgical Company, Unit of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York, N. Y. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

"Electromet" is a registered trade-mark of Electro Metallurgical Company.

Electromet
Trade Mark
Ferro-Alloys & Metals

“
**WHEN YOUR
ORDERS ARE**

KEEP

TURN TO HEWITT HOSE

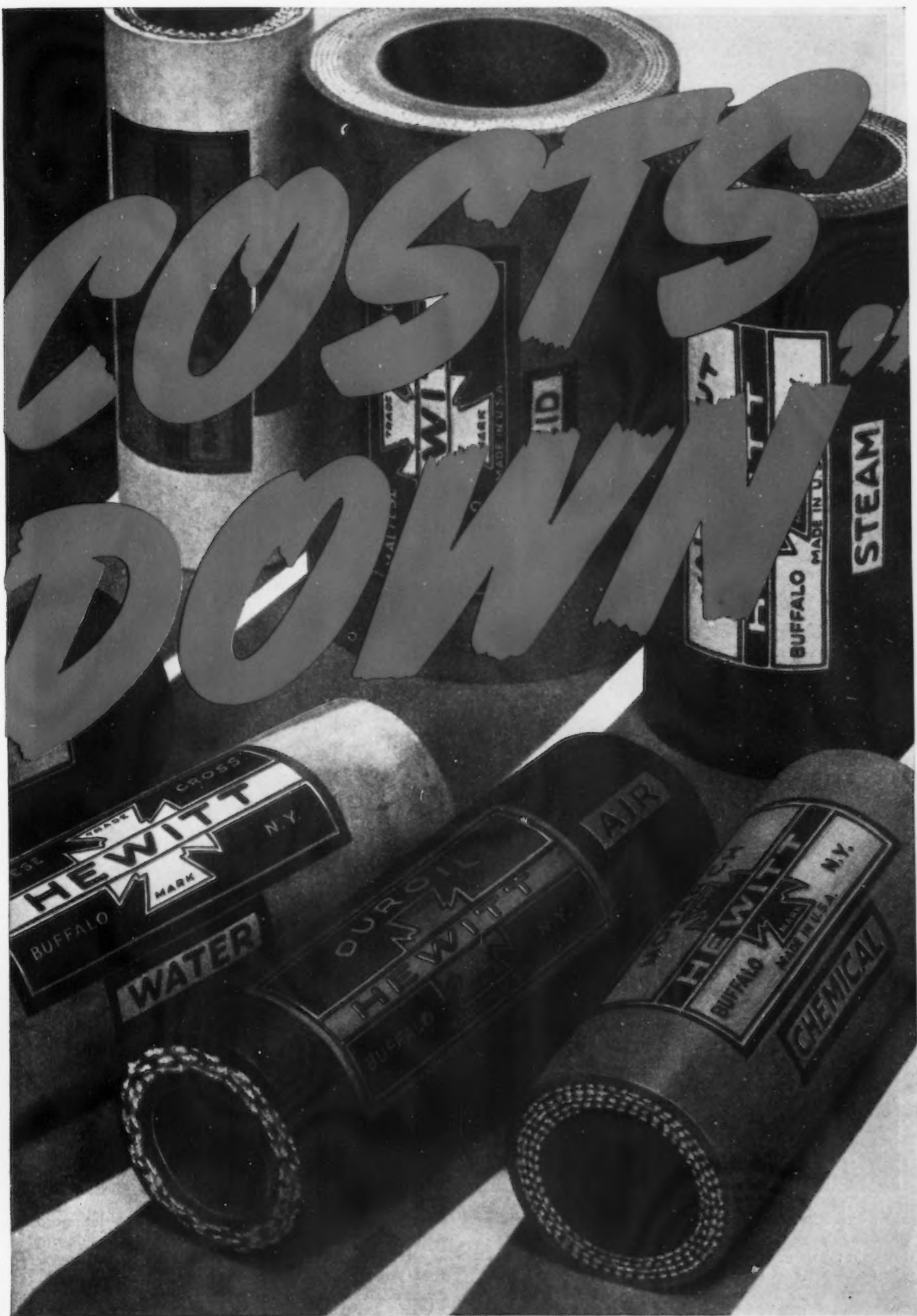
A switch to HEWITT hose is a mighty solid first line of defense against operating costs. Unusual chemical and construction features have been incorporated into many kinds of HEWITT hose to give greater utility at lower cost than was ever thought possible a few years ago. From acid and air drill to water and welding, the finest craftsmen in the rubber industry are making sure that you're getting longer service and greater economy out of every length of hose bearing the HEWITT brand. Talk to your HEWITT distributor. He's listed in the classified telephone directory of any industrial center under "Rubber Goods" or "Belting."

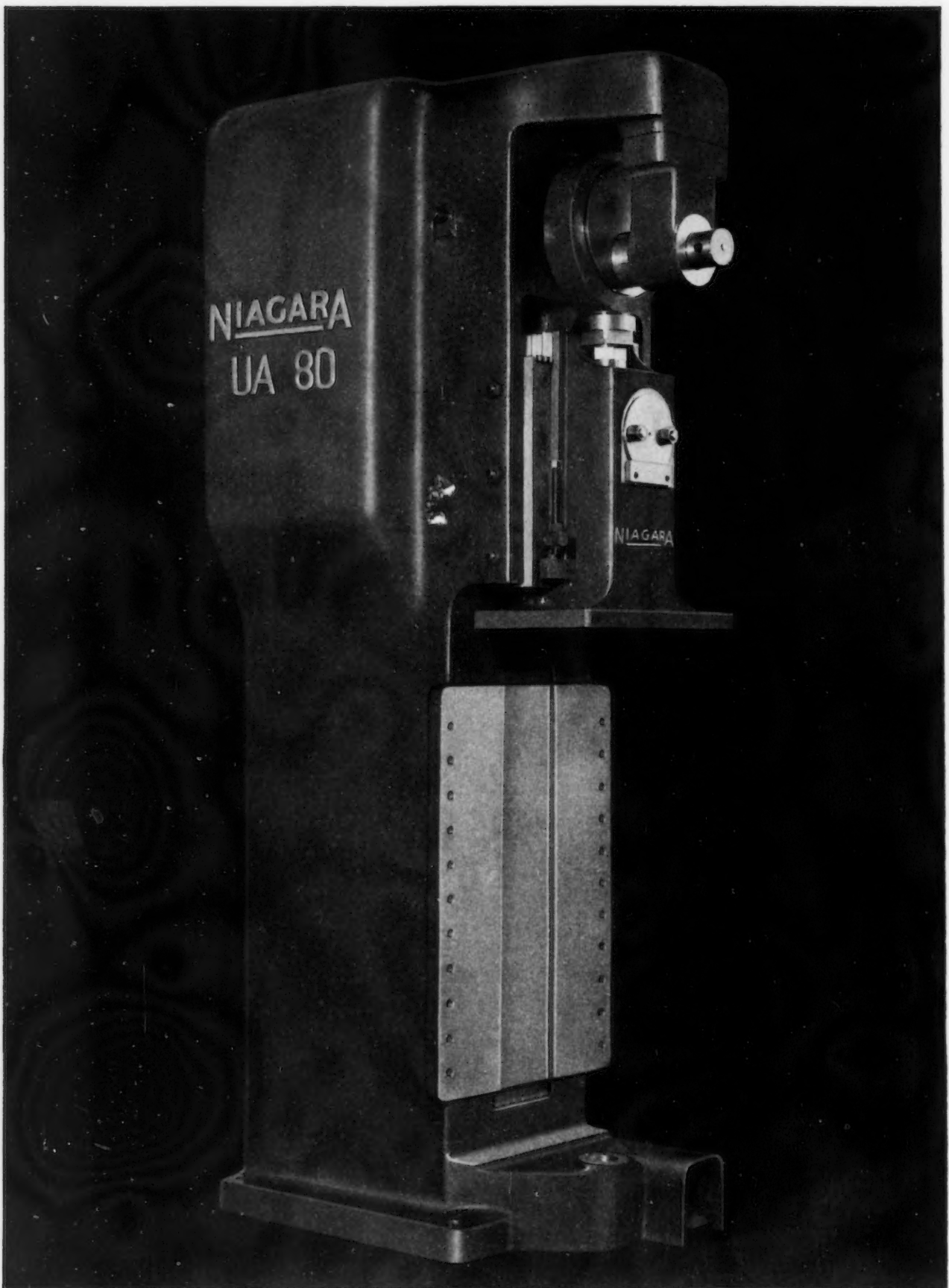
HEWITT
Rubber Corporation

BUFFALO, NEW YORK

HOSE • CONVEYOR AND TRANSMISSION BELTS • PACKING



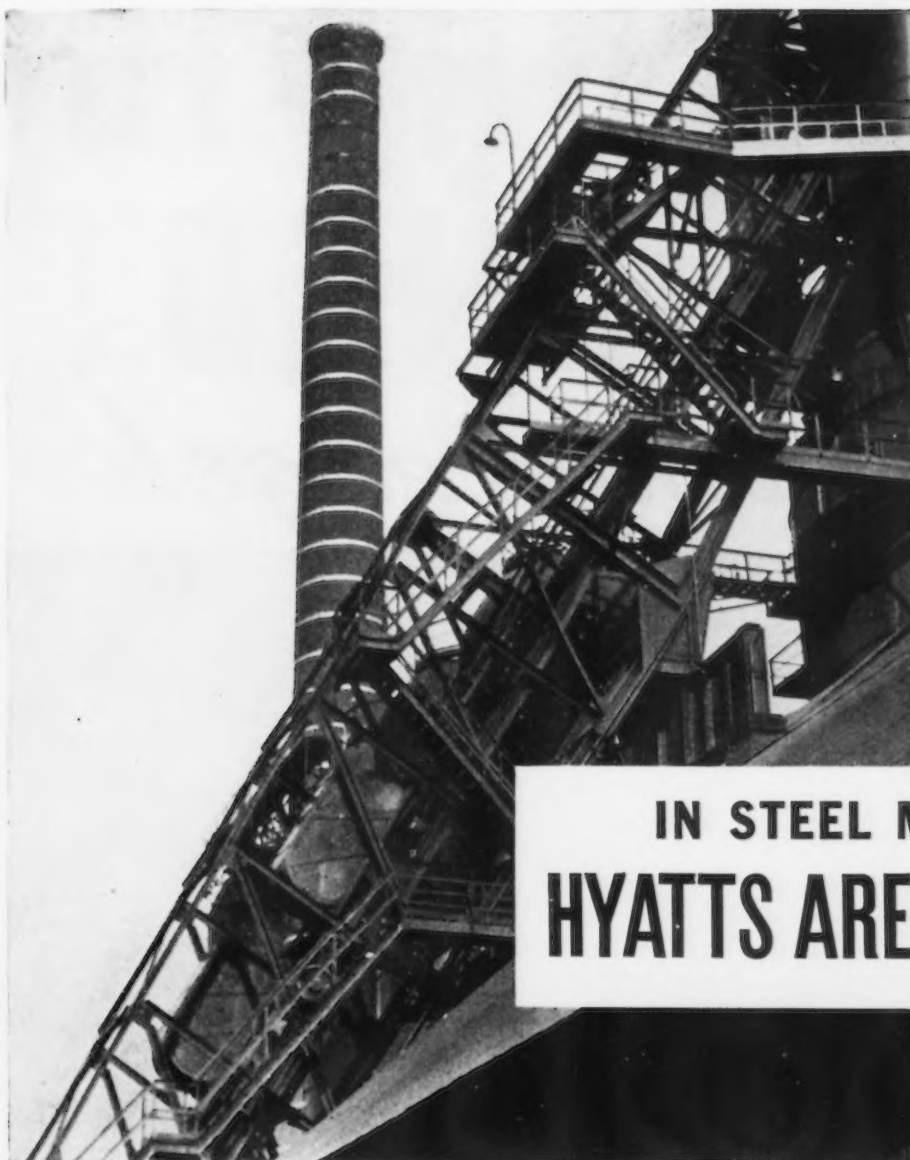




An interesting example of functional design resulting in operating economies as well as streamlined appearance is shown in this photograph of one of the Niagara Streamlined Presses.

Frame design provides strength and rigidity as well as a completely enclosed housing for shafts, gearing,

fly wheel, motor, 14-point sleeve clutch. All gears are supported between anti-friction bearings and operate in oil. Write for Bulletin 60-C. Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y. Branches: Cleveland, Detroit, New York.



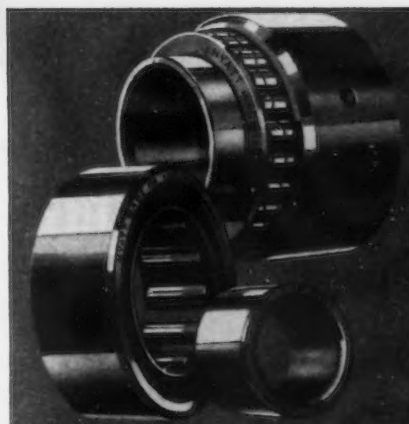
Close-up of the skip at "World's Largest Blast Furnace" showing Hyatt equipped skip cars. Another recent Hyatt "Long Life" application.

IN STEEL MILL SERVICE HYATTS ARE EVERYWHERE

Because Hyatt Roller Bearings serve so well and so long they are given first consideration when it comes time for bearing selection on any new installation or changeover.

Therefore, as you would expect, in "The World's Largest Blast Furnace" Hyatts are on the job. Here they carry the loads of the skip cars and bull wheels.

In every other modern blast furnace, and throughout every modern mill, Hyatt-equipped skip hoists, cars of every description, tables, cranes, and motors are giving the same long-lived, carefree operation that, for years, has made Hyatts the preferred steel mill bearing. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Detroit, Pittsburgh and San Francisco.

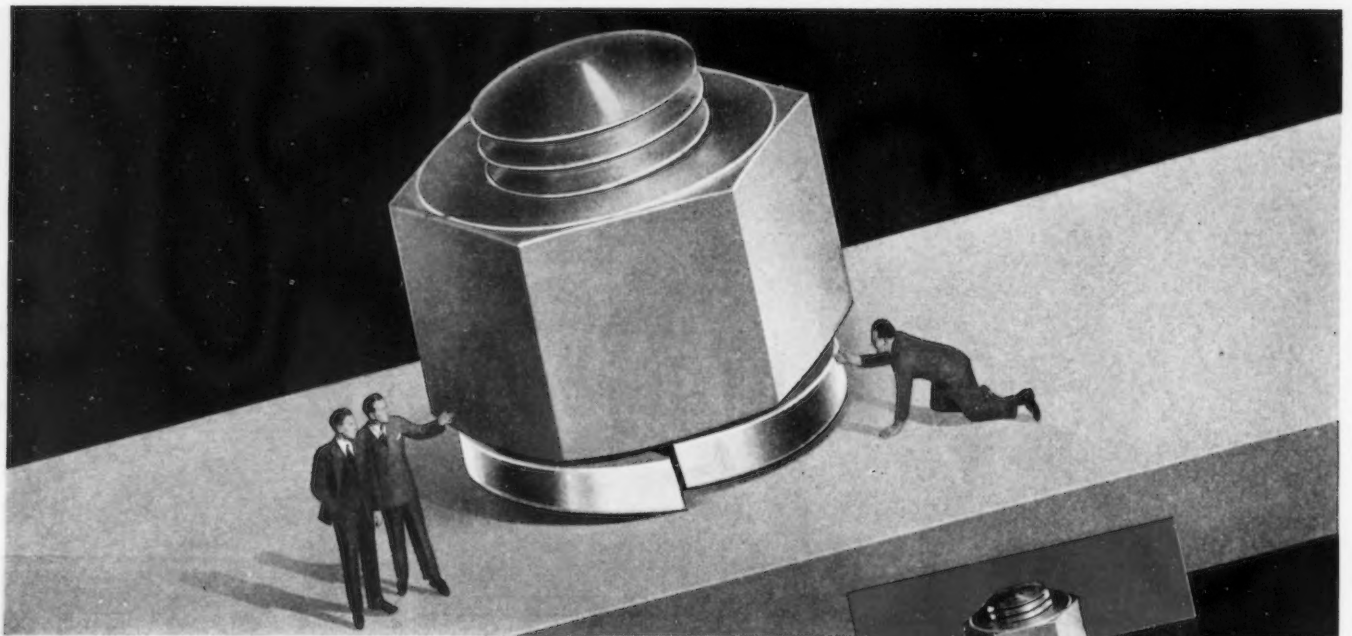


HYATT

ROLLER
BEARINGS

PRESSURE IS MAINTAINED!

- over a long range!



There is no "biting in" to weaken the pressure on the threads!

Setting up pressure on the threads tightens a nut or screw. *Maintaining pressure is the only means of keeping it tight!* Any device with teeth that bite into the bearing surfaces reduces pressure. As vibration drives the teeth farther in, the pressure becomes less and less.

Contrasted to this, a Helical Spring Washer compensates for the causes of looseness, which are bolt stretch, wear of contacting surfaces, breakdown of rust, scale or paint.

A Helical Spring Washer is the one and only locking device that maintains thread pressures over a *long range*.

SPRING WASHER INDUSTRY, Wrigley Building, Chicago, Ill.

*There is no substitute
for long range
Live action!*



Nut is tightened by setting up pressure on the threads.



The Helical Spring Washer compensates for causes of looseness.



The Helical Spring Washer maintains pressure on the threads over a long range!

IT'S EASY TO FABRICATE *REPUBLIC* ELECTRUNITE

REG. U. S. PAT. OFF.

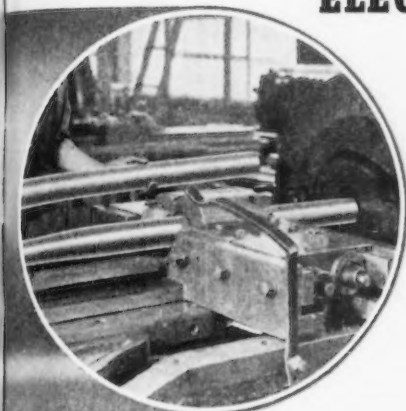
ELECTRIC RESISTANCE WELDED TUBING

● Because of its shape, tubing may be fabricated with less effort than many other sections. And because it is consistently uniform in diameter, wall thickness, concentricity and ductility, Republic ELECTRUNITE Tubing assures unvarying ease of fabrication and perfectly-formed tubular parts.

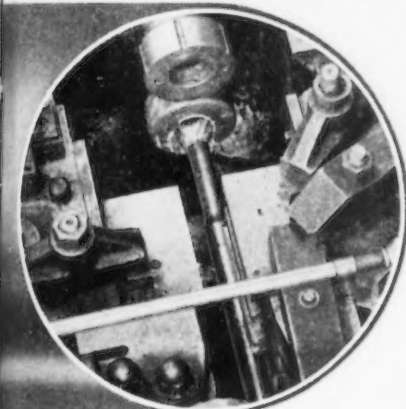
This modern electric resistance welded tubing is cold-formed from *flat-rolled* steel into a butted tube and then electric resistance welded. No heat is applied except at point of weld. Hence, Republic ELECTRUNITE Tubing may be cold-fabricated readily and accurately.

It can be bent, flanged, expanded, swaged, upset, beaded, grooved, rolled, fluted, flattened, coiled and tapered. It can be joined by welding, brazing, threading, bolting, riveting or with sweated-type or threadless compression fittings. Sheets may be attached easily and economically by various methods.

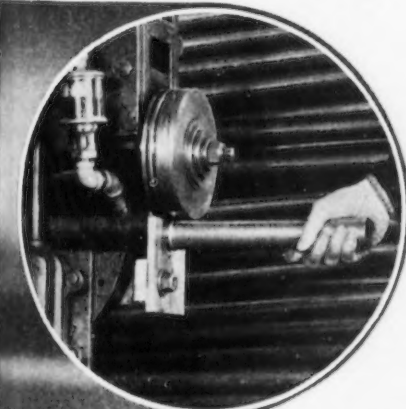
If you're a regular tubing user, give Republic ELECTRUNITE a trial and learn for yourself what its advantages can mean to your product and profits. If you've never used tubing, let our engineers show you how it can be applied to your product, and how best to fabricate it. Write—Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio—*world's largest manufacturer of steel and ferrous alloy electric resistance welded tubing.*



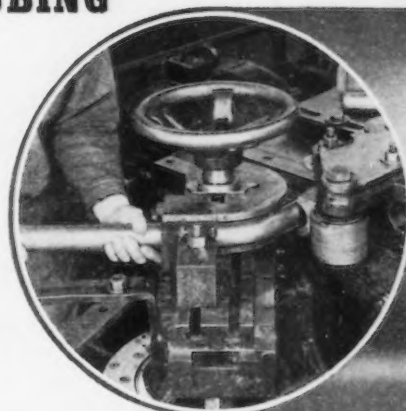
SWAGING PROPELLER SHAFTS



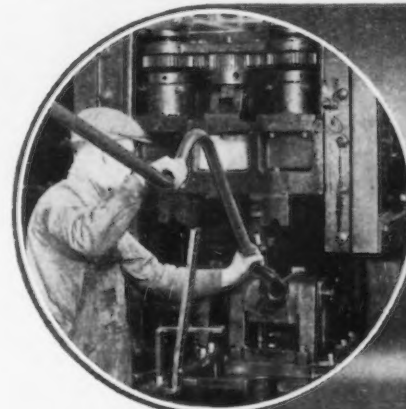
BULLDOZING TUBE ENDS



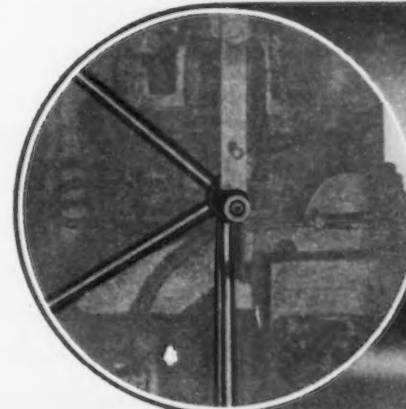
ROLLER BEADING TUBES



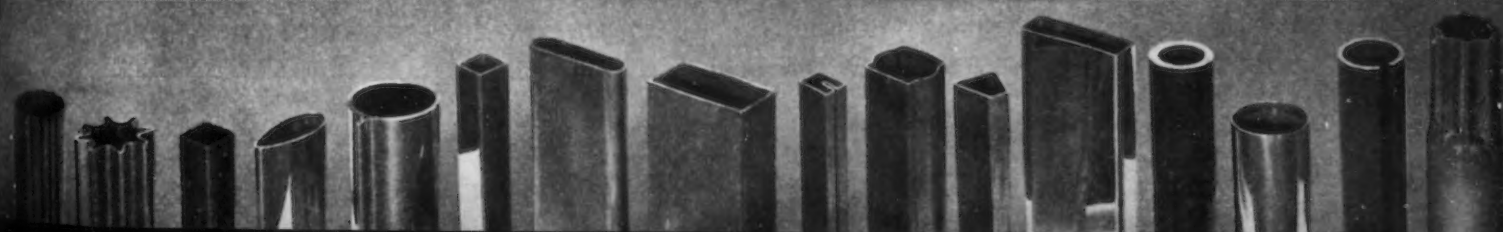
PEDESTAL TYPE BENDING



PRESS TYPE BENDING



HART PROCESS WELDING

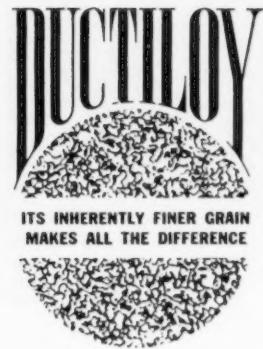
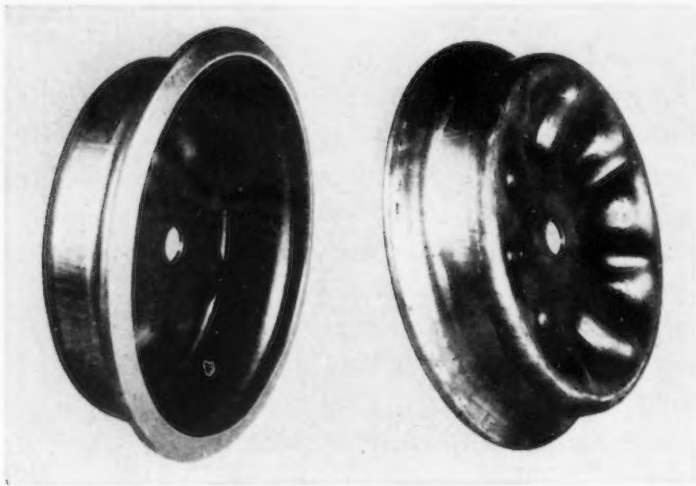


*Here's a tough "draw job", but it's an
easy one for*

DUCTILOY

National Steel High Tensile Alloy

*and these car wheels have
unusual resistance to impact, fatigue and abrasion, too!*



ITS INHERENTLY FINER GRAIN
MAKES ALL THE DIFFERENCE

Car wheels made of DuctiLOY, formed completely in two operations—1 draw, 2 flange curled.

This is a case—one of many—where the unusual ductility of DUCTILOY has won unqualified approval.

In applications such as these car wheels, where a high tensile steel is desired, *ordinary* high tensile steels often fail because they do not measure up to requirements due to their lack of ductility or cold formability. But DUCTILOY, because of its unusual ductility, can be cold formed readily, in most cases without any change in shop practice.

DUCTILOY has high fatigue and impact resistance, at normal as well as extremely low temperatures—an item of particular importance in parts or equipment that must be operated in all kinds of weather and temperature conditions.

Take advantage of the properties of DUCTILOY. Specify or use it for equipment, parts or products where you want the most for your money in high tensile steel.

Great Lakes Engineers, who have experience covering the use of DUCTILOY in all types of applications, will be glad

to consult with you on any of your problems. Ask for a Great Lakes Engineer today—you incur no obligation. Great Lakes Steel Corporation, Detroit, Mich.

GREAT LAKES STEEL CORPORATION

Boston, 1324 Statler Office Building; Buffalo, 1000 Walbridge Building; Chattanooga, 18 Volunteer Building; Chicago, 1026 Builders Building; Cleveland, 820 Leader Building; Dayton, 846 Third National Bank Building; Indianapolis, 1215-17 Circle Tower; Minneapolis, 714 Midland Bank Building; New York, 405 Lexington Avenue; Philadelphia, 407 Liberty Trust Building; St. Louis, 3615 Olive Street; San Francisco, 824 Sharon Building; Toledo, 906 Edison Building, Montreal, Quebec, Drummond, McCall & Co., Ltd.; Toronto, Ontario, Peckover's, Limited.



Division of
NATIONAL STEEL CORPORATION



Cut for tomorrow's pattern

WITH DISSTON HACK SAW BLADES

The lower cost, the greater efficiency you get with Disston Hack Saw Blades is typical of the way Disston metal cutting products meet modern machine shop and industrial demands.

Disston *Di-Mol* Hack Saw Blades are tough. They'll meet the trying feeds and speeds developed in machine sawing. They need no coddling in the hands of shop men.

And Disston *High Speed Steel* Blades are efficient in cutting metals of extreme toughness: high speed steel, die steel, chrome-nickel alloys and the like.

With a hundred years of experience, Disston stands ready to serve you, whatever materials you cut. Call your distributor of Disston Hack Saw Blades today. Or write to Henry Disston & Sons, Inc., Philadelphia.

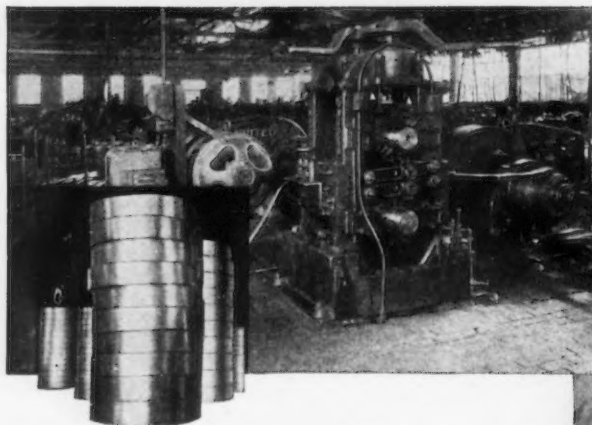
Disston made America's first machine hack saw blades in 1894.



DISSTON BLADES

when it comes to Spring Steel and Steel Springs

avail yourself of the facilities of the Complete Springmaker

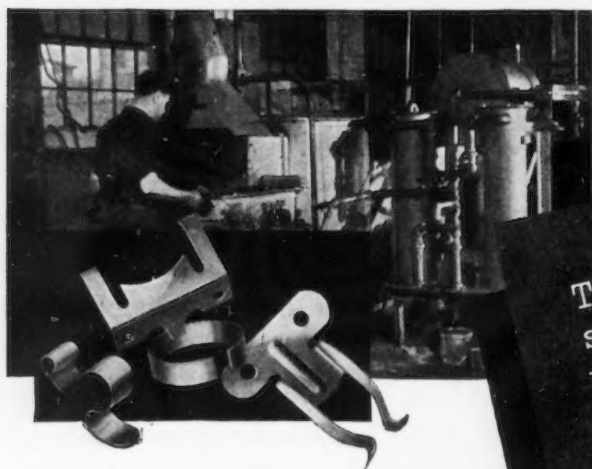


SPRING STEEL made by the Wallace Barnes Company specifically for use in springs; having ductility, hardening properties, and high fatigue properties which are the result of years of research.



TOOLS

designed and built for the fabrication of spring steel into accurate parts with the minimum of tool maintenance and low unit cost.



HEAT TREATMENT

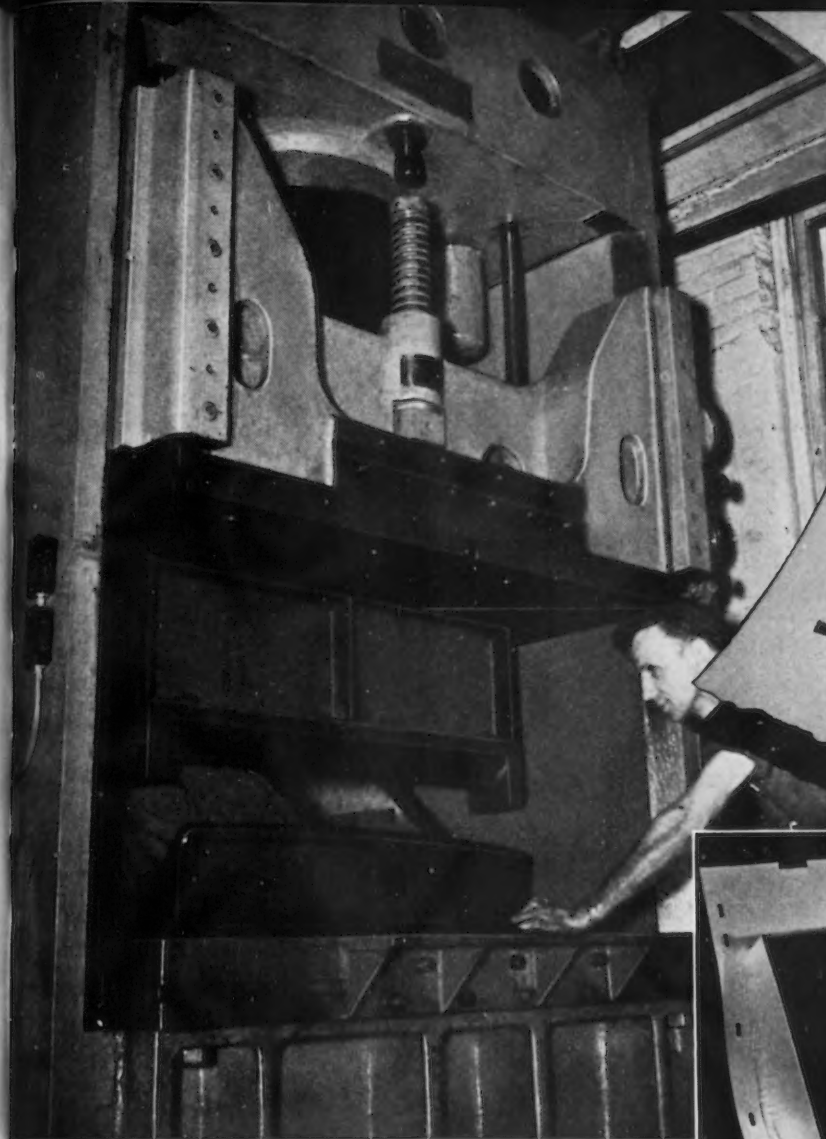
based on years of research, with ultra-modern equipment, and experience in the handling of spring steel and knowledge of spring requirements.

THESE FACILITIES, either separate or in combination, plus expert engineering advice, are available to users of spring steel or heat treated spring steel parts of any description.

Wallace Barnes Company, Bristol, Conn.

DIVISION OF ASSOCIATED SPRING CORPORATION

Ask for your free copy of the Handbook of Spring Information giving engineering and practical information on springs and spring materials



● Named "Old Gulliver" by the men who operate it because of its power and versatility, and readily adaptable to a wide variety of work, this self-contained Southwark 350-Ton Hydraulic Press has made possible a more complete service to the customers of the Peter Gray Corporation at Cambridge, Mass.

Pressure and stroke are easily adjustable for high speed metal forming and an adjustable die cushion facilitates deep drawing operations. Die set-up is simple for there is no danger of

overloading. Control is accurate and sensitive—either through a foot treadle or a hand lever at the operator's finger tips.

Southwark builds a complete line of modern hydraulic presses for every phase of metal forming. Soundly engineered, carefully built, Southwark Hydraulic Presses can help you do a better job—more economically.



BALDWIN SOUTHWARK

Division of THE BALDWIN LOCOMOTIVE WORKS
P H I L A D E L P H I A



6,100 Union Pacific Box Cars Take YOLOY REDUCING TREATMENT

...Lose 6,030,800 Pounds for Life!

● Yолоy high tensile steel scores another victory over dead weight. During 1937 and 1938 the Union Pacific Railroad built 1,400 box cars, and 700 automobile cars; in 1939—1,900 box cars and 100 High Speed Merchandise Cars for Passenger Train Service, and in 1940 are building 1,500 box cars and 500 automobile cars. The sides of all of these cars, supplied by The Youngstown Steel Door Company, were made of Yолоy.

Dead weight savings total 3,015 tons or approximately 911 pounds for each box car, and 1,306 pounds for each automobile car. Normal life and service of these cars has been increased due to the high corrosion resistance of Yолоy—4 to 6 times greater than the carbon steels.

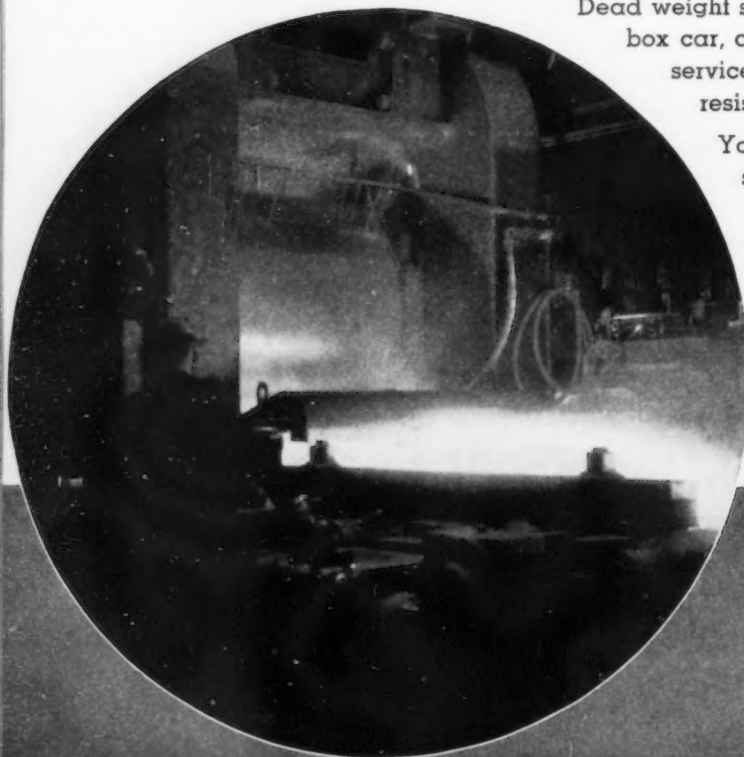
Yолоy was developed by Youngstown to provide increased strength with lighter weight. Yолоy can be welded by the arc, resistance or gas processes; has excellent corrosion fatigue properties, also greatly increased impact resistance over previously used materials.

Similar savings can be effected with all types of transportation equipment resulting in greater profits for operators.

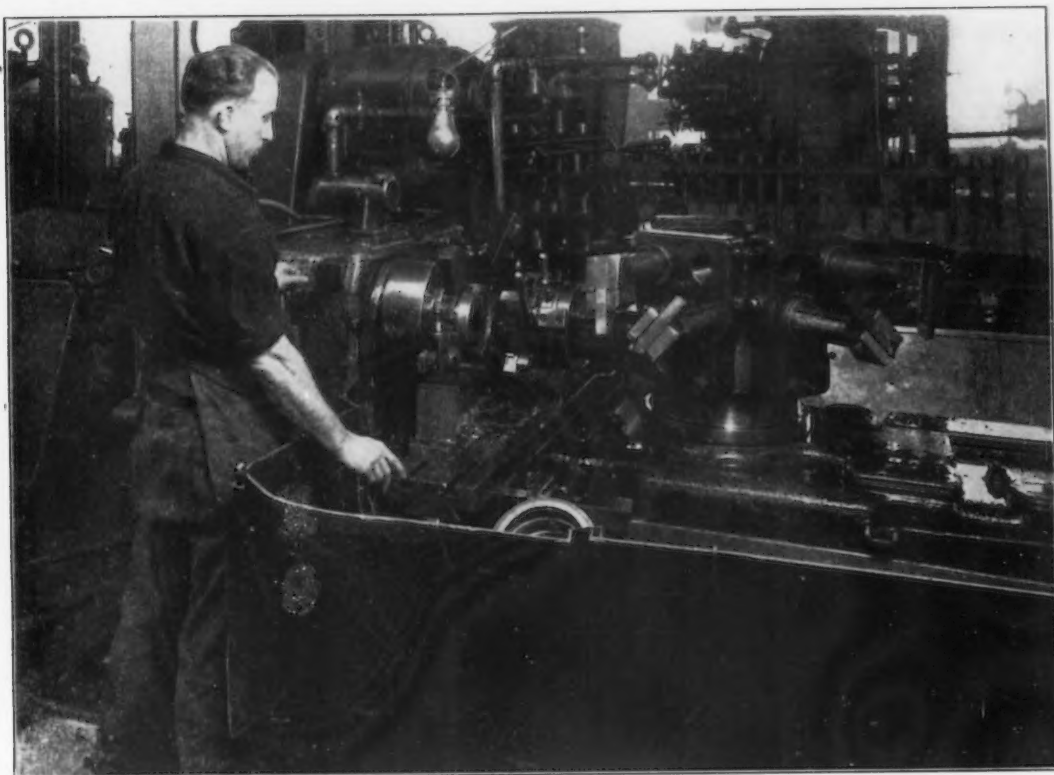
Yолоy High Tensile Steel is available in sheets, strips, plates, bars, shapes, manufacturer's wire, welding wire, seamless pipe, and electric weld pipe.

3-9C

**THE
YOUNGSTOWN
SHEET AND TUBE COMPANY**
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO



Threading Cost Reduced 80%



A typical example of the savings which may be effected by the use of modern production methods is that of threading valve seat rings

These seat rings, $7\frac{5}{8}$ " in diameter, are made from stainless steel forgings of 280-320 Brinell hardness. The thread is 12 Pitch U.S.F., $\frac{7}{8}$ " long. The 32 EX Landmatic Head—the hand opening type—is used to thread these seat rings at a cost of $1\frac{1}{4}$ cents each. By a previous method the threading cost was $8\frac{1}{2}$ cents each—thus, a reduction of 80% in threading cost is effected.

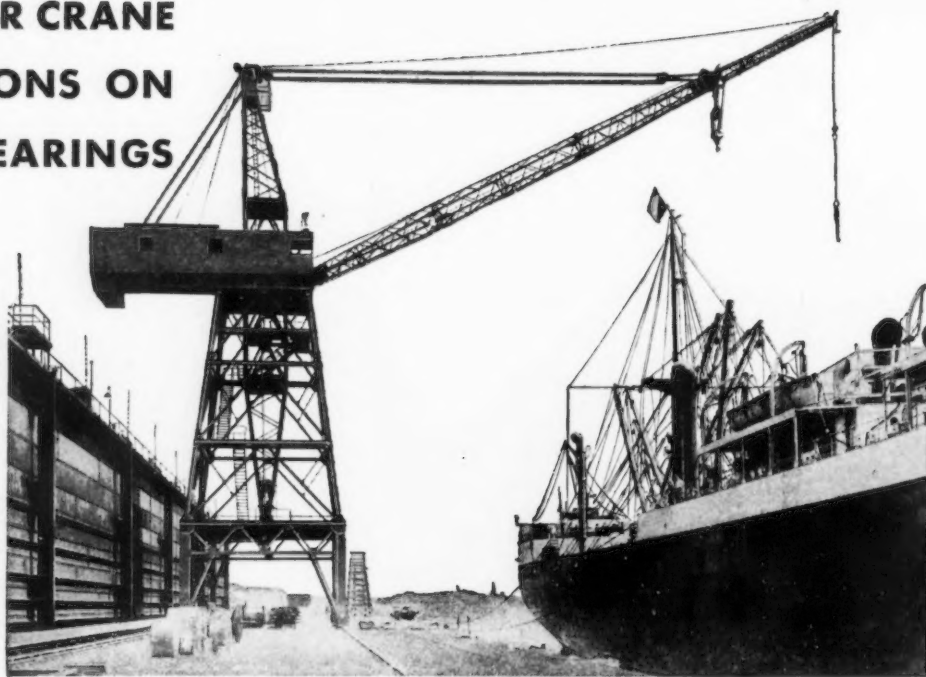
**LANDISize your Threads Write for Bulletin
No. F-90 today, covering LANDMATIC Heads.**

LANDIS MACHINE CO., Inc.
WAYNESBORO, PENNA.



Outsize STEVEDORE

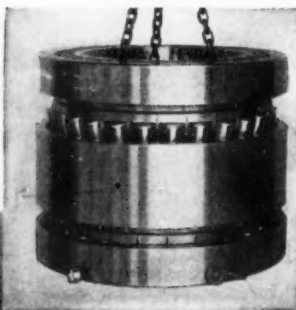
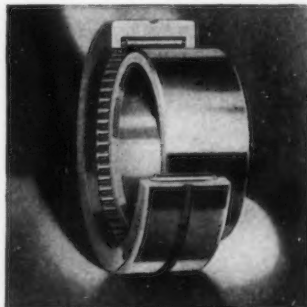
**AMERICAN TOWER CRANE
GIANT LIFTS 20 TONS ON
BANTAM QUILL BEARINGS**



Lifting 20 tons with its 105-foot boom fully extended is a simple job for this mammoth crane, built by American Hoist & Derrick Company for a large Eastern shipyard. And the block that does the lifting—the point where power-killing friction must be held to a minimum—is equipped with Bantam Quill Bearings.

(Below) **BANTAM'S QUILL BEARINGS** are designed for heavy duty. Outer race is a single channel-shaped piece—surfaces are carefully hardened—curvilinear trunnions are sturdy. There are no fragile parts in Bantam's Quill Bearing.

BANTAM'S ENGINEERING COUNSEL is based on a comprehensive knowledge of all major bearing types—straight roller, tapered roller, needle, and ball. Bantam makes them all—recommends the one best suited to your job. For impartial advice on your bearing problem, **TURN TO BANTAM.**



(Above) **THIS GIANT BEARING**—specially designed and built by Bantam for strip mill service—measures 30" O. D., 18" I. D., 20 3/4" high—a typical instance of Bantam's ability to meet the *unusual* requirement.

This application is typical of the many ways industry uses Bantam's Quill Bearing—the bearing that's simply and ruggedly built to give you low cost—ease of assembly—greater capacity in smaller space. These unusual features of the Quill Bearing may provide the answer to one of your bearing problems. For further information write for Bulletin M-104. For Needle Bearings to be used in lighter service, write our affiliate, The Torrington Company, Torrington, Conn., and ask for Circular 21-M.

BANTAM BEARINGS CORPORATION
South Bend, Indiana

BANTAM BEARINGS
STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

Lower Your Material Handling Costs with

PHILCO BATTERIES

- **TRIPLE INSULATION** insures retention of the active material in the plates of the batteries.

- **K-PROCESS** produces a plate, flint-hard throughout, yet porous for easy absorption of acid.

- **HIGH POWER ABILITY** and Sustained Voltage step up production and cut current costs.

- **SUPER-EFFICIENCY** handles the difficult jobs at high speed.

- **TREMENDOUS RESERVE POWER** takes care of the heaviest loads.

- **EXTREME DEPENDABILITY** and Great Ruggedness give trouble-free performance in your hauling day in and day out.

- **LONG LIFE** assures extra years of operation and low-cost service.

The Only Triple-Insulated Batteries with **K-PROCESSED PLATES**

Yes . . . these new Philco *super-batteries* cut your material handling costs to the bone! Exclusive Philco features, perfected by more than a quarter-century of research and experience, assure steady, continuous performance and low-cost service. Users the world over are getting complete satisfaction from these rugged Philco Batteries. Let them prove their efficiency and economy to you! Write for a Philco engineer to discuss YOUR problem!

PHILCO, Battery Division

Dept. 329, Philadelphia, Pa.



Information FREE

- 1. POWER-FACTOR**—An attempt to dispel the mystery surrounding the term "power-factor" is made in a booklet entitled "Power-Factor and Its Improvement" being distributed by General Electric Co., Schenectady. This booklet, No. GEA-3225, describes in easily understood language what power-factor is, the methods and equipment used in improving it and why it is desirable to operate with a high factor.
- 2. SPOT WELDERS**—Catalog No. 40 describes and illustrates complete line of Ace spot welders manufactured by Pier Equipment Mfg. Co., Benton Harbor, Mich. In addition to detailed information on the various models, the newly designed contactor and the new operating mechanism used on the 1940 manually operated welders are fully explained. A discussion of merits of manually and automatically operated models is included.
- 3. FORGING MACHINES**—A discussion of modern forging practice, construction details of various types of forging machines produced by the company, and suggestions for improved forge heating practice, are contained in a booklet published by Acme Machinery Co., Cleveland. Automatic feed rivet and bolt machines, a new roll threading machine and various special machines for such work as double end chamfering, automatic coupling tapping and single and double threading are illustrated.
- 4. TANKS AND FENDERS**—Condensed data, in readily usable form, designed to assist buyers prepare specifications on tanks, fenders, hoods, etc., is assembled in this handbook by Stolper Steel Products Corp., Milwaukee. Dimensions and construction methods of a wide assortment of tanks and fenders are given and photographs illustrate some of the uses to which these items are put. Equipment available to do this work is also shown.
- 5. GEARS AND REDUCERS**—A 246-page catalog listing a wide variety of stock gears has been prepared by Brad Foote Gear Works, Cicero, Ill. Gears available in bakelite and Fabroil, as well as metal gears, are listed and prices on all items are given. Sections are devoted to chains and gear reducers.
- 6. SHAMVA MULLITE**—The use of Shamva Mullite refractories in electric induction and arc furnaces, industrial boilers, ceramic kilns, etc., are covered in this bulletin by Mullite Refractories Co., Shelton, Conn. Features of mullite are said to include high softening point, low coefficient of expansion and contraction, imperviousness to slag erosion, chemical neutrality and a negligible tendency to vitrify.
- 7. UNIVERSAL DIESELS**—Construction details and typical applications of the company's line of universal diesel engines, available in ratings from 400 and 1200 hp., are contained in this booklet by American Locomotive Co., Auburn, N. Y. Applications shown include marine service, industrial lighting, pumping, dredging, commercial power and switching engines.
- 8. INDUSTRIAL FURNACES**—Bulletin No. 397, issued by W. S. Rockwell Co., New York, covers the use of retort-type, rotary heat treating furnaces for such ferrous and non-ferrous parts as require a slow rolling motion during their progress through the furnace. Details of construction and operation, typical installations and dimensions and capacities are given. Bulletin No. 396 contains numerous installation views of various types of electric and fuel fired furnaces in operation and indicates the many special conditions which have been successfully met by company's furnaces.
- 9. BALANCING MACHINES**—Static and dynamic balancing machines for locating and measuring unbalance in rotating parts are described in this booklet by Gisholt Machine Co., Madison, Wis. Detailed explanations of effects of unbalance are included, as well as diagrams and descriptions of underlying principles of the methods of correction.
- 10. SHEET METAL WELDING**—"Sheet Metal Welding Fundamentals," new 16-page booklet, Form 4435 issued by Linde Air Products Co., New York, covers design factors, control of expansion and contraction, use of jigs, and welding procedure. An outline for teaching the welding of sheet metal and tubing is also included.
- 11. ELECTRIC HOIST CONTROL**—Bulletin published by Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., illustrates single speed and selective five-speed push button control as applied to hoists and cranes. Only two buttons are required to obtain the five speeds and a switch, on a flexible mounting, capable of providing five-speed control for three motors is shown.
- 12. SELF-LOCKING NUTS**—The story of the development of Elastic Stop nuts, how they are designed, how they function and where they are used, is contained in this booklet distributed by Elastic Stop Nut Corp., Elizabeth, N. J. Results of tests to determine the relative resistance to loosening from vibration of castellated nut-steel cotter pin bolts and elastic stop nuts, conducted by an independent agency, are given. An extended listing of types available, including aircraft fittings, and prices is appended.

If you want the latest information in these brochures, encircle the numbers and mail coupon to . . .

THE IRON AGE • 239 W. 39th ST. • N. Y. C.

NAME AND TITLE.....

COMPANY.....

STREET.....

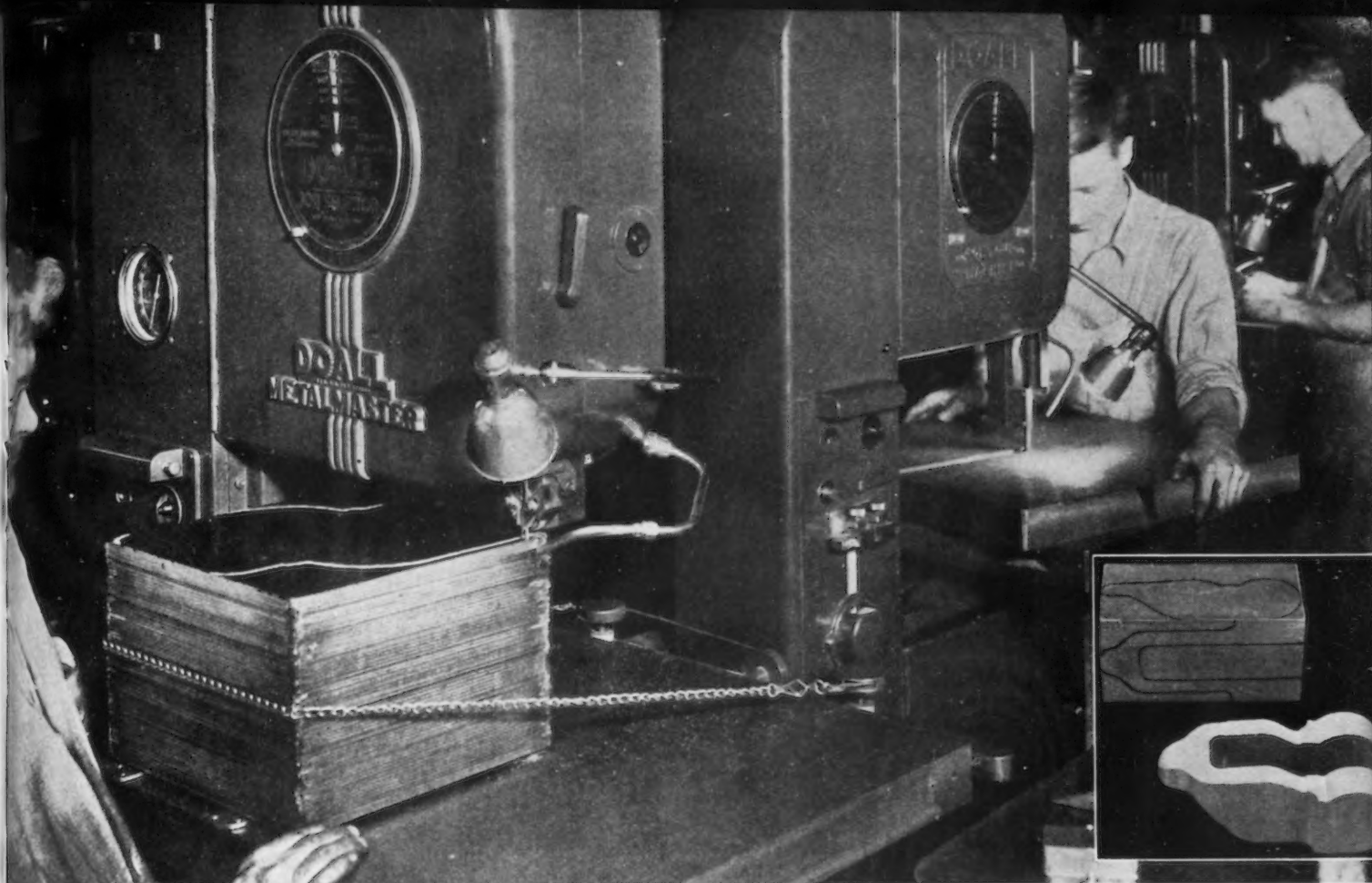
CITY AND STATE.....

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3/28/40

**ENCIRCLE
LITERATURE
BY NUMBERS**

1	2	3
4	5	6
7	8	9
10	11	12



DOALL contour machines set up for (left to right) cutting, filing and polishing. Inset: poppet lever sawed out of steel block and filed by DOALL. Courtesy Continental Machines, Inc., Minneapolis, Minnesota.

A GOOD IDEA ON PAPER BECOMES A WHIZ IN STEEL

● Last decade's development of alloys such as chromium and molybdenum made possible saw blades as narrow as 1/16-inch for cutting metal . . . gave promise of a gala comeback for the band saw—star of the lumber show at the World's Fair in '98. The idea of these new, tough, slender saws was good—on paper. How to make them actual cost cutters for the average shop was the problem.

For six years, the metal-cutting band saw went through the development mill. One improvement after another came until finally it seemed that the ideal model had been attained. It was made of seasoned

castings. It worked perfectly. But it was still in the luxury class.

Then Doctors of Design went to work on the problem with "Shield-Arc" welded steel construction. They developed a rigid, strong, light-weight machine that produced more uniform work at less cost. (The welded steel "Model V-16," does three times as much work as the "Model J" it replaces.)

Result: This versatile "contouring" machine, now profitable for the average shop, is revolutionizing many machining practices for lower costs. A good idea on paper becomes a whiz in steel . . . and in sales.

"Shield-Arc" welding has turned good ideas into profits in thousands of similar cases—in manufacturing, construction and maintenance. Try this method of uniting design ingenuity with superior materials and see how it makes *your* products *stronger, more rigid, better looking* with savings in weight, time and money.* Counsel of experienced Lincoln engineers is yours for the asking. Phone the nearest Lincoln office or write THE LINCOLN ELECTRIC COMPANY, Dept. X-6, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

LINCOLN "SHIELD-ARC" WELDING

Unites design ingenuity with superior structural materials for progress.

THEY BOTH HAVE IT—Both "Shield-Arc" and "Shield-Arc Jr." Welders have Continuous Self-Indicating "Job Selector" (assuring the right TYPE of arc) and Current Control (assuring the right AMPERAGE) for lowest costs on every job. Get free bulletin on these New Lincoln Welders.

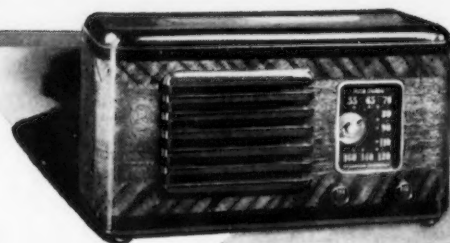
*** FOR EXAMPLE.** Standard steel shapes and pressed steel parts simplify production of DOALL machines. Eliminate patterns and expensive time-consuming steps. Accurate assembly by welding limits machining operations to a quick grinding. Result: Faster production. Lower costs.

FASTER FILLETS. Users of the new "Fleetweld 8" report 10% to 30% faster fillet welding with this smooth-flowing Lincoln Electrode. For positioned and non-positioned flat fillets. Ask for free procedure bulletin.





PENNSALT CLEANER ELIMINATES PRECLEANING, SAVING TIME AND FLOOR SPACE FOR RCA MANUFACTURING CO., INC.



● In the finishing of radio chassis and other radio parts the RCA Manufacturing Company, Inc., uses the same care and maintains the same high standards that the public has learned to identify with the world-famous products of this company.

For this reason it is highly significant that the adoption of Pennsalt Cleaners enabled RCA to eliminate entirely a pre-cleaning operation with no sacrifice in cleaning efficiency, and to gain 800 square feet of floor space formerly occupied by two conveyor type washing machines. The sale of the two machines relieved department overhead of their amortization burden.

Every plant has its individual problems unlike those of other industries, but case histories such as this suggest strongly that the Pennsalt Cleaners may offer great advantages in your own processes. Orthosil was the original heavy-duty cleaner in the Pennsalt line. Companion cleaners, meeting each need with laboratory precision, were developed for varied and extreme requirements.

They offer exceptional dissolving and emulsifying action; tremendous lasting

power; and quick efficient cleaning ability. One or more Pennsalt Cleaners can earn a money-saving place in your processes. Why not make a test? Write Dept. D and we will furnish full details. Pennsalt Cleaner Division, Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.

PENNSALT ***CLEANERS FOR INDUSTRY***



Other Pennsylvania Salt Chemical Products used in
large quantity by industry

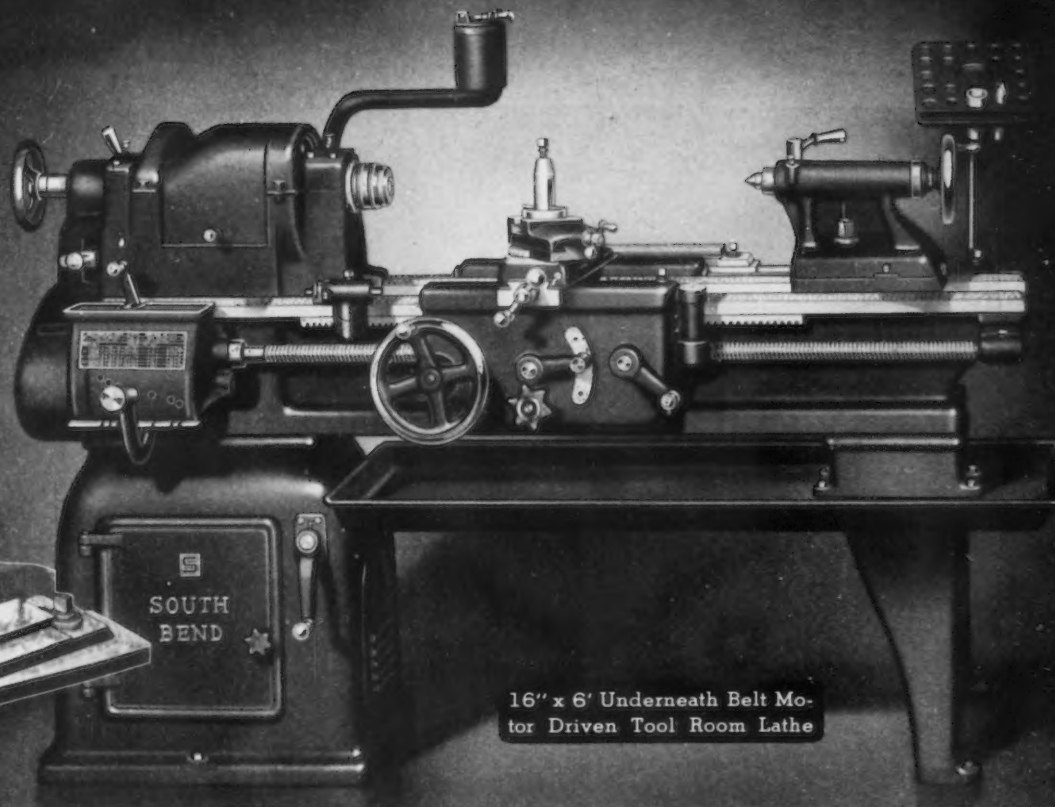
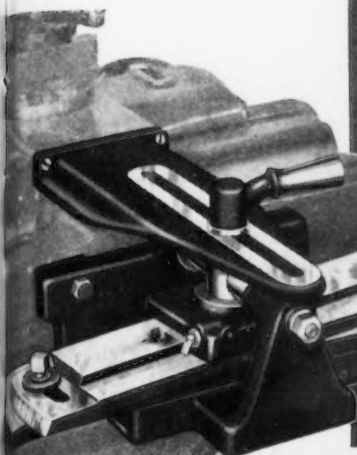
ANHYDROUS FERRIC CHLORIDE • SAL AMMONIAC
CARBON TETRACHLORIDE • SODA ASH • MINERAL ACIDS
CAUSTIC SODA • KRYOLITH • ACID-PROOF CEMENTS



PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

Telescopic Taper Attachment

Turns and bores tapers up to $3\frac{1}{2}$ inches per foot smoothly, easily and accurately. Telescopic feature eliminates necessity of disconnecting cross feed screw when taper attachment is in use.



16" x 6' Underneath Belt Motor Driven Tool Room Lathe

SOUTH BEND LATHES FOR REAL EFFICIENCY

In all classes of industry South Bend Lathes are meeting the need for real efficiency in precision machine work. All types of operations, from heavy roughing cuts on production work to precision finishing in tool and gauge departments can be economically performed on South Bend Lathes, because they have ample power, extreme accuracy and an unusually wide range of smooth, vibrationless spindle speeds.

SIZES AND TYPES

Manufactured in 9", 10", 11", 13", 14½", and 16" swing. Bed lengths 3' to 12', Quick Change and Standard Change Gear types. Motor Drive and Countershaft Drive. Attachments are available for production, tool room, laboratory and general machine work.

New South Bend Lathe Catalog

Write today for a copy of our new 112-page catalog describing all sizes and types of South Bend Lathes.

ON DISPLAY IN ALL PRINCIPAL CITIES

Popular sizes of South Bend Lathes are carried in stock for prompt delivery and demonstration by machinery dealers in 477 of the principal cities of the world. A few prominent distributors displaying South Bend Lathes are listed below. Write for name of dealer nearest you.

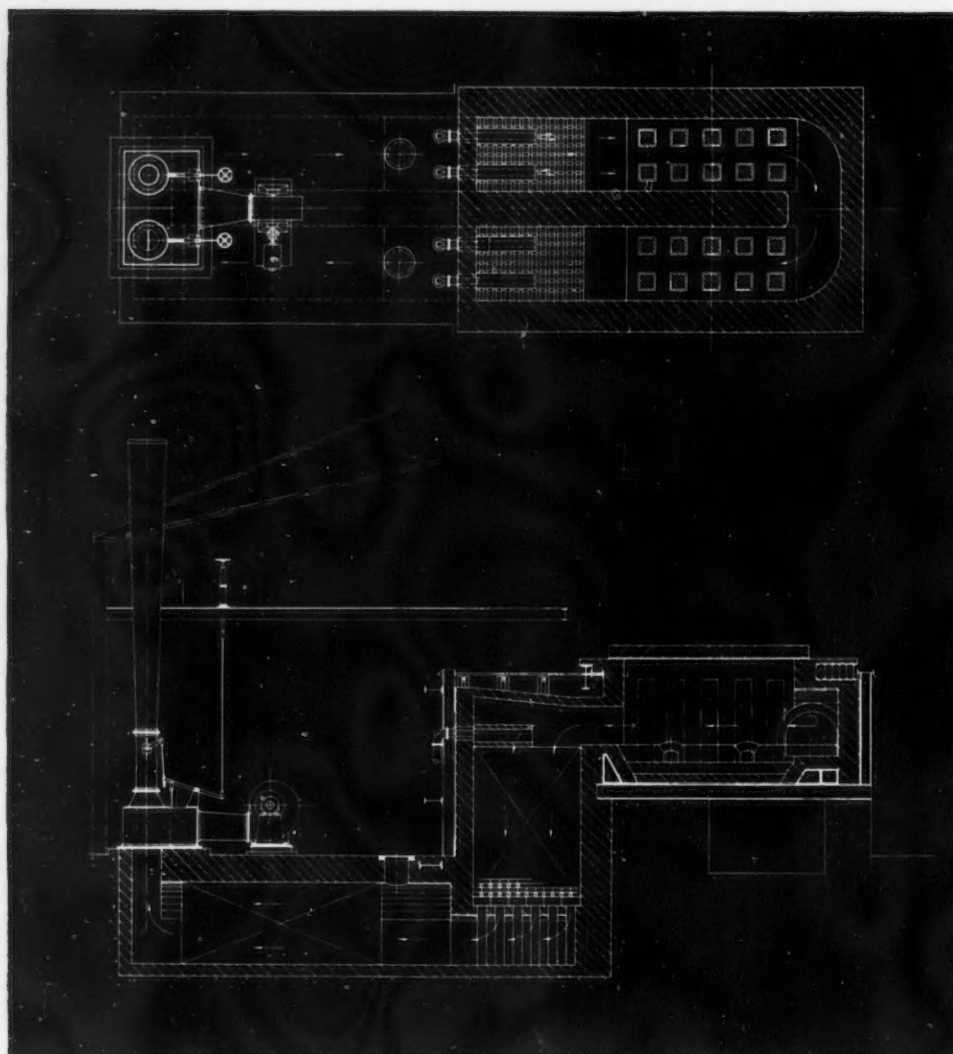
Boston, Mass.—MacKenzie Mach. Co.	Newark, N. J.—J. R. Edwards Mach. Co.
Bridgeport, Conn.—A. C. Bisgood	New York, N. Y.—A. C. Colby Mach. Co.
Chicago, Ill.—C. B. Burns Mach. Co.	Philadelphia, Pa.—W. B. Rapp, Mach.
Cleveland, Ohio—Reynolds Mach. Co.	Pittsburgh, Pa.—Tranter Mfg. Company
Dayton, Ohio—C. H. Gosiger Mach. Co.	Portland, Ore.—Portland Machinery Co.
Detroit, Mich.—Lee Machinery Company	Providence, R. I.—Geo. T. Reynolds & Son
Houston, Tex.—Wessendorff, Nelms & Co.	Rochester, N. Y.—Ogden R. Adams
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SOUTH BEND LATHE WORKS
596 E. Madison St., South Bend, Ind., U.S.A.



10-inch swing 1" Collet Capacity Underneath Belt Motor Driven Tool Room Precision Bench Lathe

Lathe Builders Since 1906



ENGLISH SOAKING PITS GO "SCOTCH"!

Notable savings in fuel, time, and space have been effected in English soaking pits through introduction of the modern Isley Furnace System of combustion control. The diagram above illustrates a compact installation of this special type in the plant of a leading British steel company. Originally designed for five holes, it now includes two additional units and is being operated with notable success.

The pits, holding 140 four-ton ingots, are fired with cold blast furnace gas which is reported to heat steel at 2375° F. very efficiently. With the main checker chambers augmented by

the horizontal checkers typical of the Isley System, the capacity is extremely high. The superheat of the air forced into the pits is within some 200° of the temperature of the gas discharged after passing through steel.

The Isley Furnace System is ideal for combustion control of soaking pits and all types of regenerative furnaces using either high-heat-intensity or lean fuels. It develops more work from less fuel, affords accurate control, saves time, space, and money. Let us give you the *facts*—show you what we are doing in this field. Write for the new Isley Bulletin.



MORGAN CONSTRUCTION CO. • WORCESTER, MASS.

English Representative: INTERNATIONAL CONSTRUCTION COMPANY

56 Kingsway, W. C. 2, London, England

V-18

ISLEY Furnace Control System

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BILLETS—Alloy
Harrisburg (Pa.) Steel Corp.
Meadvale Co., The, Nicetown, Phila., Pa.

BILLETS—Alloy Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon
Harrisburg (Pa.) Steel Corp.

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Chrome Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.

BILLETS—Re-rolling
Alan Wood Steel Co., Conshohocken, Pa.
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BILLETS—Steel
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Continental Steel Corp., Kokomo, Ind.

BILLETS—Steel
Harrisburg (Pa.) Steel Corp.
Jones & Laughlin Steel Corp., Pittsburgh.

BILLETS—Steel
Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BLANKS—Chisel
Cleveland (Ohio) Punch & Shear Works Co., The.

BLANKS—Chisel
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1806 Elston Ave.

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Brassett, H. A. & Co., Chicago, Ill.

BLAST GATES
Rockwell, W. S. Co., 50 Church St., N.Y.C.

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Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

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BLOWERS
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

BLOWERS—Rotary & Centrifugal
Roots-Connorsville Blower Corp., Connorsville, Ind.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Products Company, The, 80 East 42nd St., N. Y. C.

BLOWPIPES—Soldering, Heating, Annealing
American Gas Furnace Co., Elizabeth, N. J.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

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Ajax Mfg. Co., The, Cleveland, Ohio.

BOLT AND NUT MACHINERY
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BOLT AND NUT MACHINERY
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BOLT AND NUT MACHINERY
Waterbury (Conn.) Farrel Fdry. & Mch. Co., The.

BOLT & RIVET CLIPPERS
Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine
Bethlehem (Pa.) Steel Co.

BOLTS—Carriage and Machine
Cleveland (Ohio) Cap Screw Co., The.

BOLTS—Carriage and Machine
Lamson & Sessions Co., The, Cleveland.

BOLTS—Carriage and Machine
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Carriage and Machine
Triplex Screw Co., Cleveland.

BOLTS—Special
Cleveland (Ohio) Cap Screw Co., The.

BOLTS—Special
Lamson & Sessions Co., The, Cleveland.

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Lamson & Sessions Co., The, Cleveland.

BOLTS—Stove
Progressive Mfg. Co., Torrington, Conn.

BOLTS—Stove, Recessed Head
American Screw Co., Providence, B. I.

BOLTS—Track
Carnegie-Illinois Steel Corp., (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

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BOLTS AND NUTS
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BOLTS AND NUTS
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BOLTS AND NUTS
Cleveland (Ohio) Cap Screw Co., The.

BOLTS AND NUTS
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Gisholt Machine Co., Madison, Wisconsin.

BORING, DRILLING & MILLING MACHINES—Horizontal

Gliddings & Lewis Machine Tool Co., Fond Du Lac, Wis.

Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.

Jucas Machine Tool Co., Cleveland.

National Automatic Tool Co., Richmond, Ind.

Ohio Machine Tool Co., Kenton, Ohio.

BORING & DRILLING MACHINES—Vertical

Baker Bros., Inc., Toledo, Ohio.

Bullard Co., The, Bridgeport, Conn.

Consolidated Machine Tool Corp., Rochester, N. Y.

BORING MACHINES—Diamond & Carbide Tools

Heald Machine Co., Worcester, Mass.

BORING MACHINES—Jig

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

BORING MACHINES—Precision

Cimatool Co., The, Dayton, Ohio.

Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

BORING & TURNING MILLS—Vertical

Bullard Co., The, Bridgeport, Conn.

Cincinnati (Ohio) Planer Co.

BRAKE LINING & BLOCKS—Asbestos

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BRAKES—Electric

Clark Controller Co., The, Cleveland.

Cutler-Hammer, Inc., Milwaukee.

Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Electric & Mechanical

Clark Controller Co., The, Cleveland.

Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Magnetic

Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

BRAKES—Metal Forming

Bliss, E. W. Co., Brooklyn, N. Y.

Bryant Machinery & Engineering Co., Chicago.

BRICK—Fire Clay

Carborundum Co., The, Niagara Falls, N. Y.

Illinois Clay Products Co., Joliet, Ill.

BRICK—Insulating

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

BRIDGE BUILDERS

American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

Belmont Iron Works, Philadelphia.

BRIDGE OPERATING MACHINERY—Movable

Earle Gear & Mch. Co., Philadelphia.

BRICKETS—Ferroalloy

Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

BROACHES

Colonial Broach Co., Detroit.

Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES

Bullard Co., The, Bridgeport, Conn.

Cincinnati (Ohio) Milling Mch. Co., The.

Colonial Broach Co., Detroit.

Jucas Machine Tool Co., Cleveland.

Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

BRONZE—Phosphor

Bunting Brass & Bronze Co., Toledo, Ohio.

BRUSHES—Machine

Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BRUSHES—Wire

Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BUCKETS—Clamshell

Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh, Pa.

Cullen-Friedstedt Co., 1303 S. Kilbourn Ave., Chicago.

Hayward Co., The, 50 Church St., N. Y. C.

Heyl & Patterson, Inc., Pittsburgh.

Industrial Brownhoist Corp., Bay City, Mich.

Wellman Engineering Co., The, Cleveland.

BUCKETS—Electric Motor

Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Orange Peel

Hayward Co., The, 50 Church St., N. Y. C.

BUFFERS & POLISHING MACHINES

Packer Machine Co., The, Meriden, Conn.

BUFFING APPLICATORS—Automatic

Packer Machine Co., The, Meriden, Conn.

BUFFING COMPOUND—Stainless & Other Steels
Harrison & Co., Haverhill, Mass.

BUILDINGS—Steel
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

American Rolling Mill Co., Middletown, Ohio.

Belmont Iron Works, Philadelphia.

Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh, Pa.

Iron & Steel Products, Inc., Chicago.

BULLDOZERS

Ajax Mfg. Co., The, Cleveland, Ohio.

Cleveland Crane & Engineering Co., The.

Steelweld Machinery Div., Wickliffe, Ohio.

BURNERS—Oil or Gas

American Gas Furnace Co., Elizabeth, N. J.

BURNISHING COMPOUNDS

Magnus Chemical Co., 46 South Ave., Garwood, N. J.

BURNISHING MACHINES—Gear

Cimatool Co., The, Dayton, Ohio.

BURNING MACHINES

Cimatool Co., The, Dayton, Ohio.

BUSHINGS—Bronze

Bunting Brass & Bronze Co., Toledo, O.

Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

Shenango-Penn Mold Co., Dover, Ohio.

BUSHINGS—Drill Jig

Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

BUSHINGS—Oilless

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor Bronze

Bunting Brass & Bronze Co., Toledo, Ohio.

BY-PRODUCTS COKE AND GAS PLANTS

Koppers Co., Engineering & Construction Div., Pittsburgh.

CABINETS—Tool & Parts

Standard Steel Products Co., Poughkeepsie, N. Y.

CABLE—Electric

General Electric Co., Schenectady, N. Y.

Lincoln Electric Co., The, Cleveland.

CABLEWAYS AND TRAMWAYS—See Tramways

CALCIUM METAL & ALLOYS

Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CARBIDE

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE—Boron

Norton Co., Worcester, Mass.

CARBIDES—Cemented

Carboly Co., Inc., 1153 East 8-Mile Road, Detroit, Michigan.

CARBURIZING—See Heat Treating

CARLOADERS

Clark Tractor Div. Clark Equipment Co., Battle Creek, Mich.

CARS—Railway

Iron & Steel Products, Inc., Chicago.

CARS—Industrial and Mining

Atlas Car & Mfg. Co., The, Cleveland.

Heyl & Patterson, Inc., Pittsburgh.

CASE HARDENING—See Heat Treating

CASTERS

Darnell Corp., Ltd., Long Beach, Calif.

CASTINGS—Acid or Heat Resisting

Cramp Brass & Iron Foundries Co., Philadelphia.

Duraloy Co., The, Scottsdale, Pa.

Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

Hoskins Mfg. Co., Detroit, Mich.

Lebanon (Pa.) Steel Foundry.

Meehanite Research Institute, Pittsburgh, Pa.

Michiana Products Corp., Michigan City, Ind.

Ohio Steel Foundry Co., Lima, Ohio.

CASTINGS—Alloy Steel

Advance Foundry Co., The, Dayton, Ohio.

Detroit (Mich.) Alloy Steel Co.

Hartford (Conn.) Electric Steel Corp.

Lebanon (Pa.) Steel Foundry.

Mackintosh-Hemphill Co., Pittsburgh.

Michiana Products Corp., Michigan City, Ind.

National-Erie Corp., Erie, Pa.

CASTINGS—Aluminum

Aluminum Co. of America, Pittsburgh.

CASTINGS—Brass, Bronze, Copper or Aluminum

Bunting Brass & Bronze Co., The, Toledo, Ohio.

Cadman, A. W., Mfg. Co., Pittsburgh.

Cramp Brass & Iron Foundries Co., Philadelphia.

National Bearing Metals Corp., Pittsburgh.

Shenango-Penn Mold Co., Dover, Ohio.

Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—Bronze
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

CASTINGS—Corrosion Resisting
Cramp Brass & Iron Foundries Co., Philadelphia.

Meehanite Research Institute, Pittsburgh, Pa.

Michiana Products Corp., Michigan City, Ind.

Meadvale Co., The, Nicetown, Phila., Pa.

Ohio Steel Foundry Co., Lima, Ohio.

Wall-Colmonoy Corp., Detroit, Mich.

CASTINGS—Die

Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS—Die, Aluminum

Aluminum Co. of America, Pittsburgh.

CASTINGS—Electric Steel

Continental Roll & Steel Foundry Co., East Chicago, Ind.

Crucible Steel Castings Co., Lansdowne, Pa.

Detroit (Mich.) Alloy Steel Co.

Lebanon (Pa.) Steel Foundry.

National-Erie Corp., Erie, Pa.

Ohio Steel Foundry Co., Lima, Ohio.

CAST

PRODUCTS INDEX

CHAINS—Power Transmission
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Roller
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Silent
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAIRS—Steel, Office
Harter Corp., Sturgis, Mich.

CHAMFERING MACHINES (Gear)
Cimatool Co., The, Dayton, Ohio.

CHANNELS—See Angles, Beams, Channels and Tees

CHECKS—Metal
Cunningham, M. E., Co., Pittsburgh, Pa.

CHEMICALS—Industrial
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
Alrose Chemical Co., Cranston, Providence, R. I.
Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHROMIUM — Plating — See Plating — Chromium

CHRONOGRAPHS
Stillman, M. J., Co., Inc., Chicago.

CHUCKING MACHINES—Automatic
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

CHUCKING MACHINES—Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.
Goss & DeLeeuw Machine Co., New Britain, Conn.
National Acme Co., The, Cleveland.
Potter & Johnston Machine Co., Pawtucket, R. I.

CHUCKS—Drill
Cleveland (Ohio) Twist Drill Co., The.
Cushman Chuck Co., Hartford, Conn.
Millers Falls Co., Greenfield, Mass.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—Drill, Quick Change
Anex Machine & Tool Co., The, Dayton, Ohio.

CHUCKS—Electric
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Lathe
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Magnetic
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Taft-Pierce Mfg. Co., The, Woonsocket, R. I.

CHUCKS—Tapping
Anex Machine & Tool Co., The, Dayton, Ohio.

CLAY GUNS
Bailey, Wm. M., Co., Pittsburgh, Pa.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Sales Co., The, Wyandotte, Mich.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CLEANING EQUIPMENT (METAL)—Electro-Chemical
Bullard Co., The, Bridgeport, Conn.

CLOTHING—Asbestos & Fireproof
American Optical Co., Southbridge, Mass.

CLUTCH-BRAKES—Magnetic
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.
Hilliard Corp., The, Railroad Ave., Elmira, N. Y.
Morse Chain Co., Ithaca, N. Y.

CLUTCHES—Friction
Dodge Mfg. Corp., Mishawaka, Ind.

CLUTCHES—Magnetic
Cutler-Hammer, Inc., Milwaukee.
Dinas Magnetic Separator Co., 727 Smith St., Milwaukee.

Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES—Overrunning
Hilliard Corp., The, Railroad Ave., Elmira, N. Y.

COAL
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Koppers Coal Co., The, Pittsburgh.
Pickands Mather & Co., Cleveland.

COAL ORE & ASH HANDLING MACHINERY
Alvey-Ferguson Co., The, 700 Disney St., Cincinnati, Ohio.
Heyl & Patterson, Inc., Pittsburgh.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., 309 West Pershing Road, Chicago, Ill.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

COILS—Lead
National Lead Co., 111 Bdw., N. Y. C.

COILS—Pipe
Harrisburg (Pa.) Steel Corp.

COKE—Metallurgical
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Pickands Mather & Co., Cleveland.

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., The, Cleveland.
Koppers Co., Engineering & Construction Div., Pittsburgh.

COLD ROLL FORMING MACHINES
McKay Machine Co., The, Youngstown, Ohio.

COLLETS—Drill
Anex Machine & Tool Co., The, Dayton, Ohio.

COLUMBIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

COMBUSTION CONTROLS
Brown Instrument Co., The, Philadelphia.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.
Morgan Construction Co., Worcester, Mass.

COMPOUNDS—Drawing and Cutting
Gulf Oil Corp., Gulf Refining Co., Pittsburgh, N. J.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Standard Oil Co. (Indiana), Chicago.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

COMPRESSORS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

COMPRESSORS—Rebuilt. (See Clearing House Section)

CONDENSERS—Surface & Jet
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CONTACTS—Electrical
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

CONTRACTORS' SUPPLIES — Second-Hand. (See Clearing House Section)

CONTROL SYSTEMS—Temperature
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

CONTROLLERS—Crane
Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.

CONTROLLERS—Electric
Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Valve, Electrically Operated
Brown Instrument Co., The, Philadelphia.
Cutler-Hammer, Inc., Milwaukee.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

CONTROLS—Time Cycle
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

CONVEYING AND ELEVATING MACHINERY
Alvey-Ferguson Co., The, 700 Disney St., Cincinnati, Ohio.
Heyl & Patterson, Inc., Pittsburgh.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., 309 West Pershing Road, Chicago, Ill.
Logan Co., Inc., Louisville, Ky.
Mathews Conveyor Co., Ellwood City, Pa.

CONVEYOR WORMS
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—Gravity
Alvey-Ferguson Co., The, 700 Disney St., Cincinnati, Ohio.
Logan Co., Inc., Louisville, Ky.
Mathews Conveyor Co., Ellwood City, Pa.

JUST BETWEEN US TWO

His Eyes Bulged

LIFE recently had photographs of some of the emergency factories erected in interior China, out of reach of the invaders. A certain machinery dealer stared at one of the photographs poeyed, for in it he recognized some machinery he had sold Chiang Kai Shek's government.

The inquiry came to him through an ad in this family journal's Clearing House Section (see page 135). And he just got another one via the China Clipper. "Gosh!" he swore, "Iron Age goes everywhere." We beamed and snapped our suspenders.

Dot Thinks We're Narrow-Minded

WE squawked to *Time* last January that its reference to us as "the steel trade journal" gave a wrong impression, considering that most of our readers make finished metal products.

Quick on the trigger, *Time* snaps back with this answer dated Mar. 13:

"Many thanks for your January letter . . . We still think that all those people who make 'things of steel' are part of the 'steel trade.' . . . —Dorothy Scott, For the Editors."

Good grief, Dot, the people who make your hair curlers, the electric iron you use to press your lingerie, the Beautyrest that supports your perfect 36, the zipper in your skirt, and the metal clasps of your garters—which is probably as far as we should go—don't regard themselves as members of the "steel trade" any more than you think of yourself as a member of the paper trade.

So be a good girl, Dot, and refer to us in future as "*the favorite journal of the metals and metal products industry*," \$6 a year in the U. S., advertising rates on request."

Colorful Writing (Italics ours)

"After *wolfing* through 2332 in. of tough stuff . . ."—*Millers Falls Co. ad.*

"After *gingerly fingering* its new duties for eight months, the Procurement Division . . ."—*From a Washington dispatch by L. W. Moffett.*

"High Heat Won't *Gnaw* Rayotubes"—*Leeds & Northrup ad.*
". . . there are still enough *wayward* castings to require . . ."
—*W. A. Phair's article, "Molding Sand."*

Signal Corps Note

WHICH reminds us that when Bill Phair called at a stationery store on 6th Ave. near 39th St., to get some paper big enough to hold the mass of figures used in compiling last week's "Where Steel Went" analysis, he saw a sign reading, "*Push bell. Then walk out on sidewalk and look up to 4th floor. If in will stick head out of window.*"

Dippers, Snips and Cowbells

FISH knives, cream dippers and cowbells are among the products made by last week's additions to the one big, more or less happy family, which is now at its post-depression high.

One that mystifies us came in with a \$6 subscription check. The envelope reads, "*Karl Klenk, Wilmington, Del.—Aviation Snips.*" Offhand we would guess that an aviation snip is a sassy airliner hostess.

Bargain in 56 Years

NOBODY volunteered an easy way of figuring the next time February will have five Thursdays, so we did it the hard way, marking down one year after another. You won't get five issues again in February until 1996.

Puzzles

LAST week's pipes, X, Y and Z, filled the tank in 105, 210, 420 min. respectively.

Only one of the master minds, J. E. Morelock, v.p. of Chattanooga's Converse Bridge & Steel Co., took a crack at the army problem—the one about the messenger who rides from the tail end of a 4-mile army to the head and back to the tail, while the army moves 1 mile. And how far does the messenger travel? Mr. Morelock's 5-page solution proves you can get any number of answers between 7 and 9 miles, depending on the relative speeds of the messenger and the army.

We are sorry to hear this, as 8 miles, twice the army's length, seems so satisfying. We figured that what the rider lost going to the front, he made up on the way back, like the Cockney amusement park operator's "What I lose on the swings I make up on the roundabouts."

If you can solve this before a scum forms on the consommé, help yourself to a 190 I.Q.:

If one less than the smaller of two numbers is doubled, it will give you more than the larger number. Three times the smaller increased by four times the larger is equal to the product of the two numbers. What are the numbers?

—A.H.D.

PRODUCTS INDEX

CONVEYORS—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

COPING MACHINES
Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS—See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, Cleveland.
Western Wire Prods. Co., St. Louis, Mo.

COUNTERBORES
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTERS—Production
Streeter-Amet Co., Chicago.
Veeder-Root, Inc., Hartford, Ct.

COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS—Cut-Off Friction
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.
Hilliard Corp., The, Railroad Ave., Elmira, N. Y.

COUPLINGS—Flexible
Ajax Flexible Coupling Co., Westfield, N. Y.
Diamond Chain & Mfg. Co., Indianapolis, Ind.

James, D. O., Mfg. Co., Chicago, Ill.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Loveloy Flexible Coupling Co., 4979 Lake St., Chicago, Ill.

Morse Chain Co., Ithaca, N. Y.
Poole Foundry & Mch. Co., Baltimore, Md.

COUPLINGS—Pipe
Champion Machine & Forging Co., The, Cleveland, Ohio.
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

CRANES—Crawling
American Hoist & Derrick Co., St. Paul, Minn.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.

Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, Ohio.

CRANES—Electric, Industrial, Truck Mounted
Automatic Transportation Co., 75 W. 87th St., Chicago, Ill.
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.

Elwell-Parker Electric Co., The, Cleveland.
CRANES—Electric Traveling
Armel, James P., Pittsburgh.

Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Curtis Pneumatic Machinery Co., 1948 Klenen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.

Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, Detroit, Mich.
Robbins & Myers, Inc., Springfield, Ohio.

Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Whiting Corp., Harvey, Ill.
CRANES—Gantry
Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Dravo Corp., Engineering Wks. Div., Pittsburgh.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

Morgan Engineering Co., The, Alliance, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.
CRANES—Hand Power
American Monorail Co., The, Cleveland.

Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Curtis Pneumatic Machinery Co., 1948 Klenen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning,

Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Whiting Corp., Harvey, Ill.
CRANES—Jib
American Monorail Co., The, Cleveland.

Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.

Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Whiting Corp., Harvey, Ill.

CRANES—Locomotive
American Hoist & Derrick Co., St. Paul, Minn.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.

Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.

Link-Belt Co., 300 West Pershing Road, Chicago, Ill.
Ohio Locomotive Crane Co., The, Bucyrus, O.

CRANES—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.

Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
CRANES—Portable
Canton Fdry. & Mch. Co., Cleveland.

CRANES—Portable Electric
Automatic Transportation Co., 75 W. 87th St., Chicago, Ill.

Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANKSHAFTS
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

CRANKSHAFTS—Forged
Bay City Forge Co., Erie, Pa.
Midvale Co., The, Nicetown, Phila., Pa.

CRUSHERS—Coal
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CRUSHERS—Steel Turning
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CUPOLA CHARGING EQUIPMENT
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.

CUTTERS & BURRS—Die-makers'
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.

CUTTERS—Die Sinking
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Tomkins-Johnson Co., The, Jackson, Mich.
CUTTERS—Grinding Wheel—see Dressers
Grinding Wheel

CUTTERS—Keyseating
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

CUTTERS—Milling
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.

Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.

Gairing Tool Co., The, Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Victor Machinery Exchange, 251 Centre St., N. Y. C.

CUTTING-OFF MACHINES—Abrasives
Tabor Mfg. Co., Phila.

CUTTING-OFF MACHINES—Cold Saw
Espan-Lucas Mch. Wks., Philadelphia.

DIE CASTING MACHINES
Reed-Prentice Corp., Worcester, Mass.

DIE—Hard Carbide Inserts
McKenna Metals Co., Latrobe, Pa.

DIE SINKING MACHINES—Automatic and Hand
Cincinnati (Ohio) Milling Mch. Co., The.
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.

DIEING MACHINES—Automatic
Henry & Wright Mfg. Co., The, Hartford, Conn.

DIES, JIGS, FIXTURES, etc.
Barth Stamping & Mch. Wks., Cleveland.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

DIES—Cast Tool Steel
Advance Foundry Co., The, Dayton, Ohio.
Detroit (Mich.) Alloy Steel Co.

DIES—Drawing & Sizing
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.

DIES—Pipe Threading
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Inc., Waynesboro, Pa.

Murphy Machine Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland.

DIES—Resistance Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.

Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.

Murphy Machine Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland.

DIES—Self-Opening Adjustable
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.

Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.

Murphy Machine & Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland, Ohio.

DIES—Sheet Metal Working
Bliss, E. W., Co., Brooklyn, N. Y.
Budd, Edward G., Mfg. Co., Philadelphia, Pa.

Cimatool Co., The, Dayton, Ohio.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

DIES—Steel Letters and Stamps
Cunningham, M. E., Co., Pittsburgh, Pa.

DIESEL FUEL INJECTORS
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

DOORS & SHUTTERS, Fireproof
Kinnear Mfg. Co., Columbus, Ohio.

DOORS & SHUTTERS—Steel or Wood
Rolling
Kinnear Mfg. Co., Columbus, Ohio.

Mahon, R. C., Co., Detroit, Mich.
DRAW BENCHES
McKay Machine Co., The, Youngstown, Ohio.

DRAWN WORK—Metal—See Stampings or Drawings—Metal

DRESSERS—Grinding Wheel
Calder Mfg. Co., Lancaster, Pa.

Carboloy Co., Inc., 11153 E. 8-Mile Rd., Detroit, Mich.

DRILL HEADS—Hydraulic
National Automatic Tool Co., Richmond, Ind.

DRILL HEADS—Multiple
Baker Bros., Inc., Toledo, Ohio.

DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Cincinnati (Ohio) Bickford Tool Co., The.

Cleereman Mch. Tool Co., Green Bay, Wis.

DRIVES—Gear
Farrel-Birmingham Co., Inc., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.

DRIVES—Single & Multiple V-Belts
Allis-Chalmers Mfg. Co., Milwaukee.

DROP FORGINGS—See Forgings—Drop Iron or Steel

DROP HAMMERS—See Hammers—Drop

DUST COLLECTORS
Abrasive Machine Tool Co., East Providence, R. I.

American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Mahon, R. C., Co., Detroit, Mich.
Pangborn Corporation, Hagerstown, Md.

Whiting Corp., Harvey, Ill.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

ELECTRIC LIGHTING—Industrial
General Electric Co., Lamp Dept., Nela Park, Cleveland.

ELECTRIC WELDING—See Welding—Electric

ELECTRICAL EQUIPMENT
Allis-Chalmers Mfg. Co., Milwaukee.

ELECTRICAL MACHINERY—Second Hand. (See Clearing House Section)

ELECTRICAL WIRES
Boehling's, John A., Sons Co., Trenton, N. J.

ELECTRODE HOLDERS—Welding
Lincoln Electric Co., The, Cleveland.

ELECTRODES—Resistance Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

ELECTRODES—Welding, Coated
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Metal & Thermit Corp., 120 Broadway, N. Y. C.

ELECTROPLATING EQUIPMENT & SUPPLIES
United Chromium, Incorporated, 51 East 42nd St., N. Y. C.

ELEVATORS—Material Handling
Link-Belt Co., 300 West Pershing Road, Chicago.

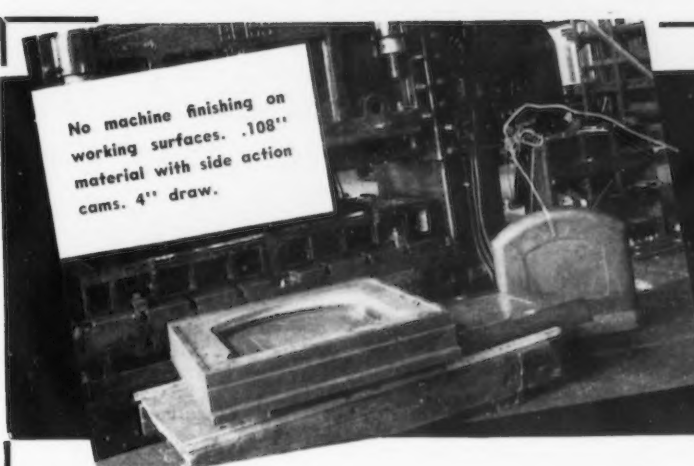
EMERY WHEELS—See Grinding Wheels

ENGINEERS—Consulting and Industrial
Koppers Co., Engineering & Construction Div., Pittsburgh.

Lindemuth, Lewis B., 134 East 47th St., N. Y. C.
Pioneer Engineering & Mfg. Co., Detroit.

ENGINES—Diesel
Diesel Engine Div. General Motors Sales Corp., Cleveland.

Ingersoll-Rand Co., 11 Broadway, N. Y. C.



No machine finishing on working surfaces. .108" material with side action cams. 4" draw.

MACHINE FINISHING *Completely* ELIMINATED ON THIS GRAVE VAULT END DIE

By casting this die to shape out of Strenes Metal, long wear alloy iron for drawing and forming dies, machine finishing of all working surfaces was **completely** eliminated.

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impressive figure, be reminded that Strenes also saves on cost of raw stock and on its great resistance to wear and breakage.

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THE ADVANCE FOUNDRY COMPANY
DAYTON, OHIO

STRENES METAL

FOR DRAWING
AND
FORMING DIES

THE IRON AGE *received a letter this week containing the following voluntary comment which is not at all unusual:*

* "The number of inquiries received to date have been far in excess of what we thought possible. Not only have they come from the most desirable credit risks, but they have been far flung, coming also from all parts of Europe, South America and Australia. There is little doubt in our minds that The Iron Age is the paper to be used to reach the worthwhile customers in the metal-working industry."

* Name on request

PRODUCTS INDEX

FERROCHROME

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROMANGANESE

Bethlehem (Pa.) Steel Co.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Jones & Laughlin Steel Corp., Pittsburgh.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.

FERROMOLYBDENUM

Climax Molybdenum Co., 580 Fifth Ave., N. Y. C.

FERROSILICO MANGANESE

Ohio Ferro-Alloys Corp., Canton, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON

Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON ALUMINUM

Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSPIEGELEISEN

New Jersey Zinc Co., The, 160 Front St., N. Y. C.

FERROTITANIUM

Metal & Thermite Corp., 120 Broadway, N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROVANADIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FIBRE—Sheets, Tubes, Rods, Fabricated Parts

Continental-Diamond Fibre Co., Newark, Delaware.

FILES & RASPS

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Diston, Henry & Sons, Inc., Philadelphia.
Nicholson File Co., Providence, R. I.

FILING MACHINES

Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

FILTER CLOTH—Asbestos

Johns-Manville Corp., 22 East 40th St., New York City.

FILTERS—Air

Whiting Corp., Harvey, Ill.

FILTERS—Oil

National Acme Co., The, Cleveland.

FIRE BRICK—Insulating

Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

FIRE CLAY

Carborundum Co., The, Perth Amboy, N. J.

Illinois Clay Products Co., Joliet, Ill.
Commonwealth Brass Corp., Detroit.

FITTINGS—Brass, Pipe and Tube

Commonwealth Brass Corp., Detroit, Mich.

FITTINGS—Welding

Crane Co., Chicago, Ill.

FLANGES—Forged Steel

Harrisburg (Pa.) Steel Corp.

Standard Steel Wks. Co., Phila., Pa.

FLANGES—Welded Steel

King Fifth Wheel Co., 5031 Beaumont Ave., Philadelphia.

FLANGING WORK—Carbon and Alloy

Worth Steel Co., Claymont, Del.

FLEXIBLE SHAFT EQUIPMENT

Lorejoy Flexible Coupling Co., 4979 Lake St., Chicago, Ill.

FLOODLIGHTS—Acetylene

Strand, N. A. & Co., Chicago.

FLOOR PLATES—See Plates—Floor or Ceiling Door

FLOORING—Acid Proof

Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

FLOORING—Monolithic

Carey, Philip, Co., The, Cincinnati, Ohio.

Johns-Manville Corp., 22 East 40th St., New York City.

FLOORING—Open Steel

Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Dravo Corp., Engineering Wks. Div., Pittsburgh.

Hendrick Mfg. Co., Carbondale, Pa.

FLUX—Soldering (Stainless Steel)

Ruby Chemical Co., Columbus, Ohio.

FLUX—Welding

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

FORGING MACHINES—Roll

Ajax Mfg. Co., The, Cleveland, Ohio.

FORGING MACHINES—Upset

Ajax Mfg. Co., The, Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.

FORGINGS—Alloy Steel

National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Aluminum

Aluminum Co. of America, Pittsburgh.

FORGINGS—Brass, Bronze or Copper

American Brass Co., The, Waterbury, Conn.
Commonwealth Brass Corp., Detroit.
Cramp Brass & Iron Foundries Co., Philadelphia.
Harvey Metal Corp., The, Chicago, Ill.
Titan Metal Mfg. Co., Bellefonte, Pa.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

FORGINGS—Coin Pressed

Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop, Iron or Steel

Atlas Drop Forge Co., Lansing, Mich.
Billings & Spencer Co., The, Hartford, Conn.
Canton (Ohio) Drop Forging & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Champion Machine & Forging Co., The, Cleveland, Ohio.

Herbrand Corp., The, Fremont, Ohio.

Poor & Co., Canton Forge & Axle Wks., Canton, Ohio.

Rockford (Ill.) Drop Forge Co.

Transue & Williams Steel Forging Corp., Alliance, Ohio.

Wilcox, D. Mfg. Co., Mechanicsburg, Pa.

Williams, J. H. & Co., Buffalo, N. Y.

FORGINGS—Hammered

Vulcan Steam Forging Co., Buffalo, N. Y.

FORGINGS—Hollow

Harrisburg (Pa.) Steel Corp.

Midvale Co., The, Nicetown, Phila., Pa.

National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Hydraulic Press, Iron or Steel

Atlas Drop Forge Co., Lansing, Mich.

Bay City Forge Co., Erie, Pa.

Bethlehem (Pa.) Steel Company.

Mesta Mch. Co., Pittsburgh.

Midvale Co., The, Nicetown, Phila., Pa.

National Forge & Ordnance Co., Irvine, Pa.

Standard Steel Wks. Co., Phila., Pa.

FORGINGS—Magnesium Alloys

American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.

Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

FORGINGS—Tool Steel

Vulcan Steam Forging Co., Buffalo, N. Y.

FORGINGS—Upset

Bethlehem (Pa.) Steel Company.

Lamson & Sessions Co., The, Cleveland.

Norris Bros., Inc., Robinson, Ill.

Rockford (Ill.) Drop Forge Co.

FOUNDRY EQUIPMENT & SUPPLIES

Whiting Corp., Harvey, Ill.

FURNACES—Billet or Ingot Heating

Salem (Ohio) Engineering Co.

Wean Engineering Co., Inc., Warren, Ohio.

Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

FURNACES—Electric, Steel Melting

American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.

Pittsburgh (Pa.) Lecomelt Furnace Corp.

FURNACES—Enameling

Carborundum Co., The, Perth Amboy, N. J.

Electric Furnace Co., The, Salem, Ohio.

General Electric Co., Schenectady, N. Y.

FURNACES—Forging

Electric Furnace Co., The, Salem, Ohio.

Holcroft & Co., Detroit.

Salem (Ohio) Engineering Co.

Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

Wean Engineering Co., Inc., Warren, Ohio.

FURNACES—Heat Treating, Automatic

American Gas Furnace Co., Elizabeth, N. J.

Electric Furnace Co., The, Salem, Ohio.

Holcroft & Co., Detroit.

Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.

Rockwell, W. S. Co., 50 Church St., N. Y. C.

HOICROFT & Co., Detroit.

Hoskins Mfg. Co., Detroit, Mich.

Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.

Rockwell, W. S. Co., 50 Church St., N. Y. C.

Salem (Ohio) Engineering Co.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES—Heat Treating, Oil or Gas

American Gas Furnace Co., Elizabeth, N. J.

Electric Furnace Co., The, Salem, Ohio.

Holcroft & Co., Detroit.

Johnson Gas Appliance Co., Cedar Rapids, Iowa.

Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.

Pennsylvania Industrial Engineers, Pittsburgh.

Salem (Ohio) Engineering Co.

Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

Wean Engineering Co., Inc., Warren, Ohio.

FURNACES—Non-Ferrous Melting

Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.

Johnson Gas Appliance Co., Cedar Rapids, Iowa.

FURNACES—Open Hearth, Consultant

Lindemuth, Lewis B., 134 East 47th St., N. Y. C.

FURNACES—Pack Heating Sheets

Wean Engineering Co., Inc., The, Warren, Ohio.

FURNACES—Rivet Heating, Gas

Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

FURNACES—Tempering

Johnson Gas Appliance Co., Cedar Rapids, Iowa.

Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.

FURNACES—Wire, Annealing and Galvanizing

General Electric Co., Schenectady, N. Y.

Salem (Ohio) Engineering Co.

Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

GAGE BLOCKS

Ford Motor Co. (C. E. Johansson Division), Dearborn, Mich.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

GAGES—Electric

Sheffield Gage Corp., Dayton, Ohio.

GAGES—Plug and Snap

Greenfield (Mass.) Tap & Die Corp.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Sheffield Gage Corp., Dayton, Ohio.

Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

GAGES—Pressure & Vacuum Recording

Brown Instrument Co., The, Philadelphia.

GAGES—Sheet Thickness

Streeter-Amet Co., Chicago.

GAGES—Surface

Millers Falls Co., Greenfield, Mass.

GAGES—Temperature

Western Electrical Instrument Corp., Newark, N. J.

GAGES—Thickness Automatic

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

GAGES—Thickness, for Rolling Mills

Haines Gauge Co., The, Phila., Pa.

GAGES—Thread Lead

Bausch & Lomb Optical Co., Rochester, N. Y.

Greenfield (Mass.) Tap & Die Corp.

Jones & Lamson Mch. Co., Springfield, Vt.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Sheffield Gage Corp., Dayton, Ohio.

GALVANIZED IRON PRIME COATING

American Chemical Paint Co., Ambler, Pa.

GALVANIZING

American Hot Dip Galvanizers Ass'n, Inc., Pittsburgh.

Cattle, Joseph P. & Bros., Phila.

Enterprise Galvanizing Co., Philadelphia.

Southern Galvanizing Co., Baltimore, Md.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

GALVANIZING PLANTS—For Sheets

Erie (Pa.) Foundry Co.

GALVANIZING POTS

Pittsburgh (Pa.) Annealing Box Co.

GAS ANALYSIS RECORDERS

Brown Instrument Co., The, Philadelphia.

Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

GAS—Boosters & Exhausters

Roots-Connorsville Blower Corp., Connorsville, Ind.

GAS FOR INDUSTRIAL USES

American Gas Association, 420 Lexington Ave., N. Y. C.

GAS PRODUCERS

Koppers Co., Engineering & Construction Div., Pittsburgh.

Morgan Construction Co., Worcester, Mass.

Wood, R. D. & Co., Philadelphia.

GASKETS—Asbestos, Metal or Rubber

Gasket-Packing Co., The, Palmyra, N. Y.

Johns-Manville Corp., 22 East 40th St., New York City.

GEAR CHECKING EQUIPMENT

Michigan Tool Co., Detroit, Mich.

GEAR CUTTING

Earle Gear & Machine Co., Phila.

Farrel-Birmingham Co., Inc., Buffalo, N. Y.

Foot Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.

Gleason Works, Rochester, N. Y.

Hartford (Conn.) Special Machinery Co., The.

James, D. O., Mfg. Co., Chicago, Ill.

National-Erie Corp., Erie, Pa.

Philadelphia (Pa.) Gear Works.

Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

Waltham (Mass.) Watch Co.

GEAR CUTTING MACHINES

Farrel-Birmingham Co., Inc., Buffalo, N. Y.

Gleason Works, Rochester, N. Y.

GEAR DRIVES—Herringbone

Continental Roll & Steel Foundry Co., East Chicago, Ind.

James, D. O., Mfg. Co., Chicago, Ill.

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.

PRODUCTS INDEX

Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St.,
N. Y. C.
Tide Water Associated Oil Co., 17 Battery
Place, N. Y. C.

GRILLES—Metal Cane
Diamond Mfg. Co., Wyoming, Pa.
Mundt, Chas., & Sons, 59 Fairmount
Ave., Jersey City, N. J.

GRILLES—Perforated Metal
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi-
cago.
Mundt, Chas., & Sons, 59 Fairmount
Ave., Jersey City, N. J.

GRINDERS—Carbide Tool
Ex-Cell-O Corp., 1210 Oakman Blvd., De-
troit, Mich.

GRINDING
Defiance Screw Mch. Prods. Div. of The
Serrick Corp., Defiance, Ohio.

**GRINDING AND POLISHING MA-
CHINES**
Bryant Machinery & Engineering Co.,
Chicago.
Excelsior Tool & Mch. Co., E. St. Louis, Ill.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Centerless
Cincinnati (Ohio) Grinders Incorporated.

GRINDING MACHINES—Chucking
Bryant Chucking Grinder Co., Springfield,
Vt.

**GRINDING MACHINES—Cutter &
Reamer**
Cincinnati (Ohio) Milling Mch. Co., The.
Gallmeyer & Livingston Co., Grand
Rapids, Mich.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Machine Tool Co., Cin-
cinnati.

GRINDING MACHINES—Cylinder
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES—Cylindrical
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati (Ohio) Grinders Incorporated.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Die
Landis Mch. Co., Inc., Waynesboro, Pa.

GRINDING MACHINES—Drill
Gallmeyer & Livingston Co., Grand
Rapids, Mich.

GRINDING MACHINES—Gear & Worm
Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GRINDING MACHINES—Hob
Barber-Colman Co., Rockford, Ill.

GRINDING MACHINES—Internal
Bryant Chucking Grinder Co., Springfield,
Vt.

Heald Machine Co., Worcester, Mass.

**GRINDING MACHINES—Internal Con-
terless**

Heald Machine Co., Worcester, Mass.

**GRINDING MACHINES—Internal Multi-
ple Spindle**

Baird Mch. Co., The, Bridgeport, Conn.

**GRINDING MACHINES—Portable Elec-
tric**

Chicago (Ill.) Wheel & Mfg. Co., 1101
W. Monroe St.

Millers Falls Co., Greenfield, Mass.

**GRINDING MACHINES—Portable Flexi-
ble Shaft**

Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

Strand, N. A., & Co., Chicago.

**GRINDING MACHINES—Portable Pneu-
matic**

Ingersoll-Rand Co., 11 Broadway, N. Y. C.

Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Precision Thread
Ex-Cell-O Corp., 1210 Oakman Blvd., De-
troit, Mich.

Jones & Lamson Machine Co., Springfield,
Vt.

GRINDING MACHINES—Radius

Van Norman Machine Tool Co., Spring-
field, Mass.

GRINDING MACHINES—Roll

Cincinnati (Ohio) Grinders Incorporated.

Farrel-Birmingham Co., Inc., Ansonia,
Conn.

Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Surface

Abrasive Machine Tool Co., E. Prov., R. I.

Blanchard Machine Co., Cambridge, Mass.

Gallmeyer & Livingston Co., Grand
Rapids, Mich.

Heald Machine Co., Worcester, Mass.

Norton Co., Worcester, Mass.

Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.

GRINDING MACHINES—Swing Frame

Shuster, F. B., Co., The, New Haven,
Conn.

GRINDING MACHINES—Tap

Gallmeyer & Livingston Co., Grand
Rapids, Mich.

GRINDING MACHINES—Tool

Cincinnati (Ohio) Milling Mch. Co., The.

Gallmeyer & Livingston Co., Grand
Rapids, Mich.

Gisholt Machine Co., Madison, Wis.

Landis Tool Co., Waynesboro, Pa.

LeBlond, R. K., Mch. Tool Co., Cincinnati.

Norton Co., Worcester, Mass.

GRINDING MACHINES—Universal
Cincinnati (Ohio) Grinders Incorporated.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Valve
Landis Tool Co., Waynesboro, Pa.

GRINDING WHEELS
Blanchard Machine Co., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Chicago (Ill.) Wheel & Mfg. Co., 1101 W.
Monroe St.

Macklin Company, Jackson, Mich.
Manhattan Rubber Mfg. Div. of Ray-
bestos-Manhattan Inc., The, 32 Townsend
St., Passaic, N. J.
Norton Co., Worcester, Mass.

GRINDING WHEEL—Mounted, Pencil
Chicago (Ill.) Wheel & Mfg. Co., 1101 W.
Monroe St.

GRIT—Steel
Harrison Abrasive Corp., Manchester,
N. H.
Pittsburgh (Pa.) Crushed Steel Co.

**HACK SAW BLADES—See Saws—Hack
Saw Blades**

HACK SAW MACHINES
Armstrong-Hlum Mfg. Co., Chicago.
Atkins, E. C., & Co., 406 So. Illinois St.,
Indianapolis, Ind.

HAMMER BOARDS
Irwin, H. G., Lumber Co., Erie, Pa.

HAMMERS—Air, Forging
Lake Erie Engineering Corp., 68 Kenmore
Sta., Buffalo, N. Y.
Loudell Car Wheel Co., Nazel Hammer
Div., Wilmington, Del.

**HAMMERS—CHIPPING & RIVETING—
Pneumatic**
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

HAMMERS—Drop
Ajax Mfg. Co., The, Cleveland.
Billings & Spencer Co., Hartford, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Erie (Pa.) Foundry Co.

Morgan Engineering Co., The, Alliance, O.
HAMMERS—Helve
Bradley, C. C., & Son, Inc., Syracuse,
N. Y.

HAMMERS—Machinists'
Ushco, 135 Tonawanda St., Buffalo, N. Y.

HAMMERS—Pneumatic

Ingersoll-Rand Co., 11 Broadway, N. Y. C.

HAMMERS—Power

Bradley, C. C., & Son, Inc., Syracuse,
N. Y.

HAMMERS—Rawhide

Chicago (Ill.) Rawhide Mfg. Co., 1806
Elston Ave.

HAMMERS—Steam

Erie (Pa.) Foundry Co.

Morgan Engineering Co., The, Alliance, O.

HANGER BEARINGS

Dodge Mfg. Corp., Mishawaka, Ind.

HANGERS—Ball Bearing

Fafnir Bearing Co., New Britain, Conn.

S K F Industries, Inc., Front St. & Erie
Ave., Phila., Pa.

HANGERS—Roller Bearing

Ilyatt Bearings Div. General Motors Sales
Corp., Harrison, N. J.

HANGERS—Shaft

Dodge Mfg. Corp., Mishawaka, Ind.

HEADING MACHINES

Ajax Mfg. Co., The, Cleveland, Ohio.

National Machinery Co., Tiffin, Ohio.

**HEADING MACHINES—Automatic, Elec-
tric**

National Machinery Co., Tiffin, Ohio.

Waterbury (Conn.) Farrel Foundry & Ma-
chine Co., The.

HEADS—Spun and Pressed

Worth Steel Co., Claymont, Del.

HEAT TREATING

Barnes-Gibson-Raymond, Detroit Plant
Div. of Associated Spring Corp.

Barnes, Wallace Co., Div. of the Asso-
ciated Spring Corp., Bristol, Conn.

General Machine Wks., York, Pa.

Parish Pressed Steel Co., Reading, Pa.

Pennsylvania Industrial Engineers, Pitts-
burgh.

Vulcan Steam Forging Co., Buffalo, N. Y.

**HEAT TREATING EQUIPMENT—Air
Draw**

Herrington & Randall, Inc., Detroit.

HEATERS—Unit

Buffalo (N. Y.) Forge Co., 492 Broadway.

Dravo Corp., Engineering Wks. Div.,
Pittsburgh.

HOBS

Barber-Colman Co., Rockford, Ill.

HOISTS—Air

Curtis Pneumatic Machinery Co., 1948
Kienlen Ave., St. Louis, Mo.

Detroit (Mich.) Hoist & Mach. Co.

Ingersoll-Rand Co., 11 Broadway, N. Y. C.

Northern Engineering Works, Detroit.

HOISTS—Chain

Yale & Towne Mfg. Co., The, Phila. Div.,
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HOISTS—Electric

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Cleveland Tramrail Div. of The Cleveland
Crane & Engineering Co., Wickliffe,
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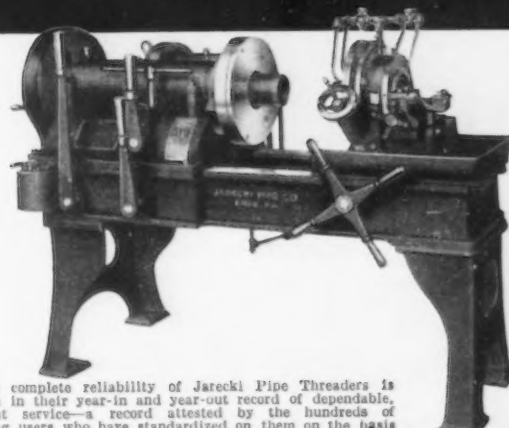
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Northern Engineering Works, Detroit, Mich.
Philadelphia (Pa.) Gear Works.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric Traveling
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOSE—Air, Oil, Steam and Water
Hewitt Rubber Corp., Buffalo, N. Y.

HOSE—Flexible Metallic
American Brass Co., The, Waterbury, Conn.

HOSE—Rubber
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

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Morgan Engineering Co., The, Alliance, O.
Watson-Stilman Co., The, 103 Aldene Road, Roselle, N. J.
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Valley Mould & Iron Corp., Hubbard, Ohio.

INGOTS—Aluminum
Aluminum Co. of America, Pittsburgh.

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American Chemical Paint Co., Ambler, Pa.

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Weston Electrical Instrument Corp., Newark, N. J.

INSTRUMENTS—Recording
Brown Instrument Co., The, Philadelphia.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

INSULATING MATERIALS—Electrical
Continental-Diamond Fibre Co., Newark, Delaware.

INSULATION
Illinois Clay Products Co., Joliet, Ill.
Johns-Manville Corp., 22 East 40th St., New York City.

IRON—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.

IRON—Rustless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

IRON WORKERS—Universal
Buffalo (N. Y.) Forge Co., 492 Broadway.
Jigs, Fixtures, Dies, etc. (See Dies, Jigs, Fixtures, etc.)

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Western Wire Prods. Co., St. Louis, Mo.

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Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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Westinghouse Electric & Mfg. Co., Lighting Div., Cleveland, Ohio.

LAMPS—Mercury Vapor
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Goss & De Leeuw Mch. Co., New Britain, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.

R. I.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
Potter & Johnston Machine Co., Pawtucket, R. I.

LATHES—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.

LATHES—Bench
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
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LATHES—Bress
Gisholt Machine Co., Madison, Wisconsin.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Warner & Swasey Co., The, Cleveland.

LATHES—Chuckling
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Mch. Co., Springfield, O.
Potter & Johnston Machine Co., Pawtucket, R. I.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Warner & Swasey Co., The, Cleveland.

LATHES—Contour Turning
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Crankschaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Potter & Johnston Machine Co., Pawtucket, R. I.

LATHES—Engine
Bryant Machinery & Engineering Co., Chicago.

Cincinnati (Ohio) Lathe & Tool Co.
Hendey Machine Co., Torrington, Conn.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Reed-Prentice Corp., Worcester, Mass.
Rockford (Ill.) Machine Tool Co.
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—High Speed
Hendey Machine Co., Torrington, Conn.
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Roll
Continental Roll & Steel Foundry Co., East Chicago, Ind.

LATHES—Toolroom
Cincinnati (Ohio) Lathe & Tool Co.
LeBlond, R. K., Machine Tool Co., Cincinnati, Ohio.

Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

South Bend (Ind.) Lathe Works, 587 East Madison St.

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Acme Machine Tool Co., The, Cincinnati, Ohio.
Bardons & Oliver, Inc., Cleveland.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.

Jones & Lamson Mch. Co., Springfield, Vt.
Potter & Johnston Machine Co., Pawtucket, R. I.

South Bend (Ind.) Lathe Works, 587 East Madison St.

Warner & Swasey Co., The, Cleveland.

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Bullard Co., The, Bridgeport, Conn.

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LEAD—in Oil
National Lead Co., 111 Bdway., N. Y. C.

LEAD—Tellurium
National Lead Co., 111 Bdway., N. Y. C.

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Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LEGGINGS—Safety
American Optical Co., Southbridge, Mass.

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McKay Machine Co., The, Youngstown, Ohio.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Torrington (Conn.) Mfg. Co., The.

Voss, Edward W., Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.

LOCOMOTIVES—Diesel
Diesel Engine Div. General Motors Sales Corp., Cleveland.

LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., The, Cleveland

LOCOMOTIVES—Gasoline
Plymouth (Ohio) Locomotive Works Div. Fate-Root-Heath Co.

LOCOMOTIVES—Industrial
Diesel Engine Div. General Motors Sales Corp., Cleveland.
Plymouth (Ohio) Locomotive Works Div. Fate-Root-Heath Co.

PRODUCTS INDEX

LOCOMOTIVES—Steam
Iron & Steel Products, Inc., Chicago.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., The, Cleveland.

LUBRICANTS—Crusher & Grinding
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Gear
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
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Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Texas Company, The, 135 East 42nd St., N. Y. C.
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Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Sun Oil Co., Philadelphia.
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Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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General Machine Works, York, Pa.
Gilmour, J. Morrison, 151 Lafayette St., N. Y. C.
S & R Folding Machine Co., Inc., The, 841 E. 134th St., N. Y. C.
Taft-Pelree Mfg. Co., The, Woonsocket, R. I.
Treadwell Engineering Co., Easton, Pa.

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Dings Magnetic Separator Co., 727 Smith St., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
Ohio Electric Mfg. Co., The, 5908 Mauric Ave., Cleveland.

MAGNETS—Separating—See Separators—Magnetic

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LIQUID AIR PRODUCTS COMPANY, The, 30 East 42nd St., N. Y. C.

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CROSBY CO., The, Buffalo, N. Y.

Southern Products, Independence, Mo.

Torrington (Conn.) Company.

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Cincinnati (Ohio) Milling Mch. Co., The, Kearney & Trecker Corp., Milwaukee, Wisc.

Ohio Machine Tool Co., Kenton, Ohio.

Potter & Johnston Machine Co., Pawtucket, R. I.

Van Norman Machine Tool Co., Springfield, Mass.

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Cincinnati (Ohio) Planer Co., Consolidated Machine Tool Corp., Rochester, N. Y.

MILLING MACHINES—Ram Type Universal
Van Norman Machine Tool Co., Springfield, Mass.

MILLING MACHINES—Second-Hand
(See Clearing House Section)

MILLING MACHINES—Vertical
Brown & Sharpe Mfg. Co., Prov., R. I.

Cincinnati (Ohio) Milling Mch. Co., The, Kearney & Trecker Corp., Milwaukee, Wisc.

Potter & Johnston Machine Co., Pawtucket, R. I.

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Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

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Allis-Chalmers Mfg. Co., Milwaukee.

Chicago (Ill.) Electric Co., Delco Products Div. General Motors Corp., Dayton, Ohio.

General Electric Co., Schenectady, N. Y.

Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

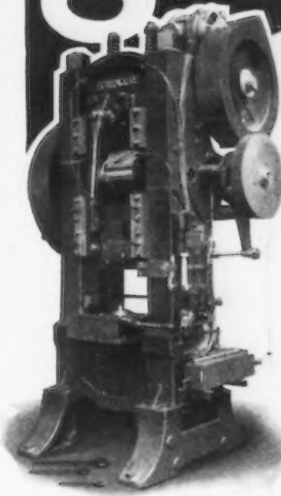
Howell (Mich.) Electric Motors Co., Lincoln Electric Co., Cleveland.

Westinghouse Elec. & Mfg. Co., E. Pgh.

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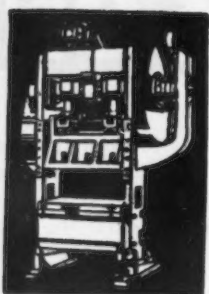
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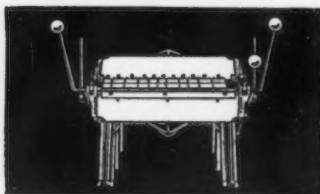
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McKenna Metals Co., Latrobe, Pa.

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International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

NITROGEN
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Norton Co., Worcester, Mass.

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National Acme Co., The, Cleveland.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Lock
Elastic Stop Nut Corp., Elizabeth, N. J.
Standard Pressed Steel Co., Jenkintown, Pa.

NUTS—Machine Screw
Progressive Mfg. Co., Torrington, Conn.

NUTS—Semi-Finished
Cleveland (Ohio) Cap Screw Co., The.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Wing
Parker-Kalon Corp., 200 Varick St., N. Y. C.

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Garlock Packing Co., The, Palmyra, N. Y.

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Pure Oil Co., The, Chicago.

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Texas Company, The, 135 East 42nd St., N. Y. C.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Soluble—See Oils—Cutting

ORE BRIDGES
Dravo Corp., Engineering Wks. Div., Pittsburgh.

ORES—Iron
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Plekands Mather & Co., Cleveland.

ORES—Manganese
Cuban-American Manganese Corp., 122 East 42nd St., N. Y. C.

OVENS—Coke and By-Product Recovery
Koppers Co., Engineering & Construction Div., Pittsburgh.

OVENS—Core and Mold
Herrington & Randall, Inc., Detroit.
Holcroft & Co., Detroit.

OVENS—Enameling and Japanning
Carborundum Co., The, Perth Amboy, N. J.

Herrington & Randall, Inc., Detroit.
Mahon, R. C. Co., Detroit, Mich.

OXY-ACETYLENE—Shape-Cutting Machines
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

OXYGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

PACKING—Felt
American Felt Co., 315 Fourth Ave., N. Y. C.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Locomotive Cylinder
Koppers Co., American Hammered Piston Ring Div., Baltimore, Md.

PACKING—Metallic
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

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Carey, Philip, Co., The, Cincinnati, Ohio.
Garlock Packing Co., The, Palmyra, N. Y.
Hewitt Rubber Corp., Buffalo, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

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Sipe, James B., & Co., Pittsburgh.

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Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

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Voss, Edward W., Pittsburgh, Pa.

PATTERN WORK—Wood
York (Pa.) Pattern Works

PATTERN PERFORATING METAL
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.

Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES
Mesta Mch. Co., Pittsburgh.

PICKLING TANK LININGS
Cellcote Co., The, Cleveland, Ohio.
National Lead Co., 111 Bldway., N. Y. C.

PICKLING TANK STEAM JETS
Durlon Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PIG IRON
Bethlehem (Pa.) Steel Co.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson (Ohio) Iron & Steel Co., The.
Jones & Laughlin Steel Corp., Pittsburgh.
Plekands Mather & Co., Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

PIG IRON CASTING PLANTS
Heyl & Patterson, Inc., Pittsburgh.

PILING—Steel Pipe
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PILING—Steel sheet
American Rolling Mill Co., Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

PILLOW BLOCKS
Medart Co., The, St. Louis, Mo.

PINIONS
Waltham (Mass.) Watch Co.

PINIONS—Carbon Hard-surfaced
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.

PINIONS—Rolling Mill
Continental Roll & Steel Foundry Co., East Chicago, Ind.

Mesta Mch. Co., Pittsburgh.

PINIONS—Wire and Rod
Rathbone, A. R. & J., Palmer, Mass.

PINS—Cutter
Lamson & Sessions Co., The, Cleveland.

PIPE—Alloy
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PIPE—Cast Iron, B. & S. & Flanged
Wood, R. D., & Co., Philadelphia.

PIPE—Lead
National Lead Co., 111 Bldway., N. Y. C.

PIPE—Lead Lined
National Lead Co., 111 Bldway., N. Y. C.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.

Greenpoint Iron & Pipe Co., Inc., 340 Stagg St., Bklyn., N. Y.

PIPE—Seamless Brass or Copper
American Brass Co., The, Waterbury, Conn.

PIPE—Seamless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PRODUCTS INDEX

PIPE—Spiral Welded
American Rolling Mill Co., Middletown, O.
Crane Co., Chicago.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

PIPE—Welded, Electric
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.

PIPE COVERING—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

PIPE FITTINGS
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.

PIPE THREADING & CUTTING MACHINES
Cox & Sons Co., The, Bridgeton, N. J.
Jarecki Mfg. Co., Erie, Pa.
Landis, Mach. Co., Inc., Waynesboro, Pa.
Merrell Mfg. Co., Toledo.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PISTON RINGS
Koppers Co., American Hammered Piston Ring Div., Baltimore, Md.

PLANERS
Cincinnati (Ohio) Planer Co.
Ohio Machine Tool Co., Kenton, Ohio.

PLANERS—Hydraulic
Rockford (Ill.) Machine Tool Co.

PLANERS—Plate
Cleveland (Ohio) Punch & Shear Works Co., The.

PLANERS—Rotary
Cleveland (Ohio) Punch & Shear Works Co., The.
Espin-Lucas Mch. Wks., Philadelphia.

PLANING MACHINES — Second Hand.
(See Clearing House Section)

PLASTICS—Moulded
Continental-Diamond Fibre Co., Newark, Delaware.

PLASTER'S CLEANING COMPOUND
American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Cellar Door
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.

PLATES—Iron or Steel
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Joseph T. & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown (Ohio) Sheet & Tube Co., The.

PLATFORMS—Skid
Standard Pressed Steel Co., Jenkintown, Pa.

PLATING—Chromium
United Chromium, Incorporated, 51 East 42nd St., N. Y. C.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.

POLISHING & BUFFING MACHINES—Automatic
Packer Machine Co., The, Meriden, Conn.

POLISHING COMPOUND — Stainless Steel
Harrison & Co., Haverhill, Mass.

POLISHING MACHINES
Packer Machine Co., The, Meriden, Conn.

POLISHING MACHINES—Band
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

POLISHING MACHINES—Bar
Medart Co., The, St. Louis, Mo.

POWER TRANSMITTING MACHINERY
Dodge Mfg. Corp., Mishawaka, Ind.

POWER UNITS—Rotary
Cushman Chuck Co., Hartford, Conn.
New Departure Div., General Motors Sales Corp., Bristol, Conn.

POWER UNITS—Straight Line
Cushman Chuck Co., Hartford, Conn.

PRECIPITATORS—Electrostatic Dust
Pangborn Corporation, Hagerstown, Md.

PRESS BRAKES—See Brakes—Metal Forming

PRESS FEEDS—Automatic
Cleveland (Ohio) Punch & Shear Works Co., The.
Little, F. J., Mch. Co., Chicago.

PRESSED METAL PARTS
Budd, Edward G., Mfg. Co., Phila., Pa.
Champion Sheet Metal Co., Inc., c/o Squires & Duane Sts., Cortland, N. Y.

Davis Brake Beam Co., Laurel Ave. & A St., Johnstown, Pa.
New England Pressed Steel Co., Natick, Mass.

Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

PRESSED STEEL PARTS
Budd, Edward G., Mfg. Co., Phila., Pa.
Crosby Co., The, Buffalo, N. Y.
Lansing (Mich.) Stamping Co., So. Penn. Ave.
Parish Pressed Steel Co., Reading, Pa.
Stanley Works, The, New Britain, Conn.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

PRESESSES—Automatic
Bliss, E. W., Co., Brooklyn, N. Y.
Cleveland (Ohio) Punch & Shear Works Co., The.

Henry & Wright Mfg. Co., The, Hartford, Conn.

Niagara Mch. & Tool Wks., Buffalo, N. Y.

PRESESSES—Baling
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

McKay Machine Co., The, Youngstown, Ohio.

PRESESSES—Broaching
Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.

PRESESSES—Coining
Bliss, E. W., Co., Brooklyn, N. Y.

Cleveland (Ohio) Punch & Shear Works Co., The.

Farquhar, A. B., Co., Ltd., York, Pa.

Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.

Minster (Ohio) Machine Co.

National Machinery Co., Tiffin, Ohio.

Zeh & Hahnemann Co., Newark, N. J.

PRESESSES—Die Sinking
Farquhar, A. B., Co., Ltd., York, Pa.

Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.

PRESESSES—Drawing
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

Cleveland (Ohio) Punch & Shear Works Co., The.

Farquhar, A. B., Co., Ltd., York, Pa.

Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.

Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.

PRESESSES—Drop—See Hammers—Drop

PRESESSES—Embossing
Farquhar, A. B., Co., Ltd., York, Pa.

PRESESSES—Extrusion
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

Cleveland (Ohio) Punch & Shear Works Co., The.

Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.

PRESESSES—Foot
Baird Mch. Co., The, Bridgeport, Conn.

Niagara Machine & Tool Works, Buffalo, N. Y.

Waterbury (Conn.) Farrel Foundry & Machine Co., The.

PRESESSES—Forging
Ajax Mfg. Co., The, Cleveland, Ohio.

Cleveland (Ohio) Punch & Shear Works Co., The.

Farquhar, A. B., Co., Ltd., York, Pa.

Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.

Mesta Mch. Co., Pittsburgh.

Morgan Engineering Co., The, Alliance, O.

Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.

PRESESSES—Forming and Bending
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

Cincinnati (Ohio) Shaper Co., The.

Cleveland Crane & Engineering Co., The.

Steelweld Machry. Div., Wickliffe, Ohio.

Cleveland (Ohio) Punch & Shear Works Co., The.

Drels & Krump Mfg. Co., Chicago.

Farquhar, A. B., Co., Ltd., York, Pa.

Ferracute Machine Co., Bridgeton, N. J.

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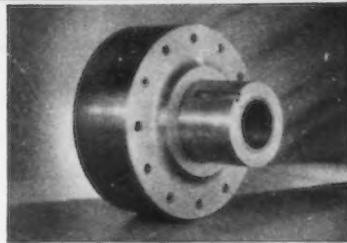
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vard Bldg., 7810 Woodward Ave.
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less Steel and Other Alloys.

PRODUCTS INDEX

- PRESSES—Metal Extrusion**
Watson-Stillman Co., The, 103 Aldene
Road, Roselle, N. J.
- PRESSES—Plastics Molding**
Hydraulic Press Mfg. Co., The, Mt. Gilead,
Ohio.
- PRESSES—Power**
Watson-Stillman Co., The, 103 Aldene
Road, Roselle, N. J.
- Blair Mch. Co., The, Bridgeport, Conn.**
Bliss, E. W., Co., Brooklyn, N. Y.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The
Steelweld Machry. Div., Wickliffe, Ohio.
Cleveland (Ohio) Punch & Shear Works
Co., The.
- Farrel-Birmingham Co., Inc., Ansonia
Conn.**
Ferracute Machine Co., Bridgeton, New
Jersey.
- Hyman, Joseph, & Sons, Phila.**
Minster (Ohio) Machine Co.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
V. & O Press Co., Hudson, N. Y.
Waterbury (Ct.) Farrel Fdry. & Mch.
Co., The.
- Zeh & Hahnemann Co., Newark, N. J.**
- PRESSES—Stamping**
Cleveland (Ohio) Punch & Shear Works
Co., The.
- Farquhar, A. B. Co., Ltd., York, Pa.**
Hydraulic Press Mfg. Co., The, Mt.
Gilead, Ohio.
- PRESSES—Straightening**
Farquhar, A. B. Co., Ltd., York, Pa.
Hydraulic Press Mfg. Co., The, Mt.
Gilead, Ohio.
- PRESSES—Trimming**
Bliss, E. W., Co., Brooklyn, N. Y.
Cleveland (Ohio) Punch & Shear Works
Co., The.
- Erie (Pa.) Foundry Co.**
Niagara Mch. & Tool Wks., Buffalo, N. Y.
- PROJECTORS—Contour Measuring**
Bausch & Lomb Optical Co., Rochester,
N. Y.
- PULLEYS—Cast Iron, For V-Belts**
American Pulley Co., Pressed Steel Stamp-
ing Div., Philadelphia.
- PULLEYS—Friction Clutch**
Dodge Mfg. Corp., Mishawaka, Ind.
- PULLEYS—Magnetic**
Cutler-Hammer, Inc., Milwaukee.
Stearns Magnetic Mfg. Co., 635 So. 28th
St., Milwaukee.
- PULLEYS—Solid & Split**
American Pulley Co., Pressed Steel Stamp-
ing Div., Philadelphia.
- Falls Clutch & Mchry. Co., The, Cuyahoga
Falls, Ohio.**
- PULVERIZERS**
American Pulverizer Co., 1489 Macklind
Ave., St. Louis, Mo.
- Whiting Corp., Harvey, Ill.**
- PUMPS—Acid Resisting**
Duriron Co., Inc., The, 438 N. Findlay
St., Dayton, Ohio.
- PUMPS—Boiler Feed**
Ingersoll-Rand Co., (Cameron) 11 Broad-
way, N. Y. C.
- PUMPS—Centrifugal**
Ingersoll-Rand Co., (Cameron) 11 Broad-
way, N. Y. C.
- Ruthman Machinery Co., Cincinnati.**
Tomkins-Johnson Co., The, Jackson, Mich.
- PUMPS—Coolant**
Ruthman Machinery Co., Cincinnati.
- PUMPS—Hydraulic**
Baldwin-Southwark Div. Baldwin Locomo-
tive Wks., Philadelphia.
- Watson-Stillman Co., The, 103 Aldene
Road, Roselle, N. J.**
- PUMPS—Hydraulic—Radial—Variable**
Reversible Delivery
Hydraulic Press Mfg. Co., The, Mt.
Gilead, Ohio.
- PUMPS—Power Transmission**
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Mil-
waukee.
- PUMPS—Rotary Positive, Centrifugal &
Turbine**
Crane Co., Chicago.
Roots-Connorsville Blower Corp., Connors-
ville, Ind.
- PUMPS—Steam**
Ingersoll-Rand Co. (Cameron), 11 Broad-
way, N. Y. C.
- PUNCHES & DIES**
Cleveland (Ohio) Punch & Shear Works
Co., The.
- Cleveland Steel Tool Co., The, 660 E.
82d St., Cleveland, Ohio.**
- PUNCHING AND SHEARING MA-
CHINES**
Bertsch & Co., Cambridge City, Ind.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works
Co., The.
- Excelsior Tool & Mach. Co., E. St. Louis,
Ill.**
Niagara Machine & Tools Works, Buffalo,
N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
- PYROMETERS—Indicating**
Brown Instrument Co., The, Philadelphia.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., 4956 Stanton Ave.,
Philadelphia.
- RAILS**
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.
- Foster, L. B., Co., Inc., Pittsburgh.**
Frank, M. K., 480 Lexington Ave., N. Y. C.
Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Bir-
mingham, Ala.
- RAILS—Relaying**
Frank, M. K., 480 Lexington Ave.,
N. Y. C.
- Hyman-Michaels Co., Chicago.**
Iron & Steel Products, Inc., Chicago.
Sherwood, E. C., 50 Church St., N. Y. C.
- RAILWAY EQUIPMENT & SUPPLIES**
Iron & Steel Products, Inc., Chicago.
Pettibone Mulliken Corp., Chicago.
- REAMERS**
Carboly Co., Inc., 11153 East 8-Mile
Road, Detroit, Michigan.
- Cleveland (Ohio) Twist Drill Co., The.**
Gisholt Machine Co., Madison, Wisconsin.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bed-
ford, Mass.
- Pratt & Whitney Div. Niles-Bement-Pond
Co., Hartford, Conn.**
- REAMING MACHINES**
Blanchard Machine Co., Cambridge, Mass.
- REAMERS—Expansion**
Apex Machine & Tool Co., The, Dayton,
Ohio.
- Barber-Colman Co., Rockford, Ill.**
Gairing Tool Co., The, Detroit.
Greenfield (Mass.) Tap & Die Corp.
- RECORDERS—Furnace Atmosphere**
Brown Instrument Co., The, Philadelphia.
- REELS—For Coil Stock**
Littell, F. J., Mch. Co., Chicago.
- REFRACTORIES**
Babcock & Wilcox Co., The, 85 Liberty
St., N. Y. C.
- Carborundum Co., The, Perth Amboy,
N. J.**
Illinois Clay Products Co., Joliet, Ill.
Norton Co., Worcester, Mass.
- REGULATORS—Compressed Gas**
Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.
- Linde Air Products Company, The, 30 East
42nd St., N. Y. C.**
- REINFORCEMENT FABRIC—Concrete**
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.
- RIDDLES—Foundry**
Ludlow-Saylor Wire Co., St. Louis, Mo.
- RINGS—Iron or Steel**
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Co., Phila., Pa.
- RINGS—Welded**
King Fifth Wheel Co., 5081 Beaumont
Ave., Philadelphia.
- RIVET MAKING MACHINERY**
National Machinery Co., Tiffin, Ohio.
Waterbury (Conn.) Farrel Foundry & Ma-
chine Co., The.
- RIVET SETS**
Cleveland (Ohio) Punch & Shear Works
Co., The.
- Cleveland Steel Tool Co., The, 660 E.
82d St., Cleveland, Ohio.**
- RIVETING MACHINES**
Hannifin Mfg. Co., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Ct.
Tomkins-Johnson Co., The, Jackson, Mich.
- RIVETS**
American Screw Co., Providence, R. I.
Clark Bros. Bolt Co., Milldale, Conn.
Hassall, John, Inc., Clay & Oakland Sts.,
Bklyn., N. Y.
- Progressive Mfg. Co., Torrington, Conn.**
Russell, Burdall & Ward Bolt & Nut
Co., Port Chester, N. Y.
- ROCK BITS**
Timken Roller Bearing Co., Canton, Ohio.
- RODS—Aluminum**
Aluminum Co. of America, Pittsburgh.
- RODS—Brass**
American Brass Co., The, Waterbury,
Conn.
- Titan Metal Mfg. Co., Bellefonte, Pa.**
- RODS—Magnesium Alloys**
American Magnesium Corp., 1701 Gulf
Bldg., Pittsburgh.
- Dow Chemical Co., The, 921 Jefferson Ave.,
Midland, Mich.**
- RODS—Nickel Silver**
American Brass Co., The, Waterbury,
Conn.
- RODS—Phosphor Bronze**
American Brass Co., The, Waterbury,
Conn.
- RODS—Rustless**
Rustless Iron & Steel Corp., Baltimore, Md.
- RODS—Welding**
Air Reduction Sales Co., 60 East 42nd
St., N. Y. C.
- American Brass Co., The, Waterbury,
Conn.**

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American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 Broadway, N. Y. C.
Pittsburgh (Pa.) Steel Co.
Titan Metal Mfg. Co., Bellefonte, Pa.

RODS—Welding, Hard Surfacing
Wall-Colmonoy Corp., Detroit, Mich.

RODS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.

Bethlehem (Pa.) Steel Co.

Jones & Laughlin Steel Corp., Pittsburgh.

Pittsburgh (Pa.) Steel Co.

Wickwire Brothers, Cortland, N. Y.

Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Youngstown (Ohio) Sheet & Tube Co., The.

ROLLER LEVELERS—Backed Up

McKay Machine Co., The, Youngstown, Ohio.

Voss, Edward W., Pittsburgh, Pa.

ROLLING MACHINERY—Cold Rolling

Bliss, E. W. Co., Brooklyn, N. Y.

Continental Roll & Steel Foundry Co., East Chicago, Ind.

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.

United Engineering & Fdry. Co., Pgh.

ROLLING MACHINERY—Sheet Metal

Continental Roll & Steel Foundry Co., East Chicago, Ind.

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.

Torrington (Conn.) Mfg. Co., The.

ROLLING MILL MACHINERY

Birdsboro (Pa.) Steel Foundry & Machine Co.

Bliss, E. W. Co., Brooklyn, N. Y.

Yoder Co., The, Cleveland.

Continental Roll & Steel Fdry. Co., East Chicago, Ill.

Farrel-Birmingham Co., Inc., Ansonia, Ct.

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.

McKay Machine Co., The, Youngstown, Ohio.

Mesta Mch. Co., Pittsburgh.

Morgan Construction Co., Worcester, Mass.

Morgan Engineering Co., The, Alliance, O.

National Roll & Fdry. Co., Avonmore, Pa.

United Engineering & Fdry. Co., Pgh.

Voss, Edward W., Pittsburgh, Pa.

Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

ROLLING MILLS—Copper Rod & Sheet

Torrington (Conn.) Mfg. Co., The.

ROLLS—Alloy Steel

Continental Roll & Steel Fdry. Co., East Chicago, Ind.

McKay Machine Co., The, Youngstown, Ohio.

Ohio Steel Foundry Co., Lima, Ohio.

Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh.

ROLLS—Bending and Straightening

Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

Bertsch & Co., Cambridge City, Ind.

Cleveland (Ohio) Punch & Shear Works Co., The.

McKay Machine Co., The, Youngstown, Ohio.

Niagara Machine & Tool Works, Buffalo, N. Y.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

ROLLS—Forging

Ajax Mfg. Co., The, Cleveland.

ROLLS—Rubber Covered

Castle Rubber Co., East Butler, Pa.

Hewitt Rubber Corp., Buffalo, N. Y.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 32 Townsend St., Passaic, N. J.

ROLLS—Sand Chilled Iron and Steel

Birdsboro (Pa.) Steel Foundry & Machine Co.

Continental Roll & Steel Fdry. Co., East Chicago, Ind.

Farrel-Birmingham Co., Inc., Ansonia, Conn.

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.

Mackintosh-Hemphill Co., Pittsburgh

Mesta Mch. Co., Pittsburgh.

National Roll & Fdry. Co., Avonmore, Pa.

Ohio Steel Foundry Co., Lima, Ohio.

Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh.

United Engineering & Fdry. Co., Pgh.

ROLLS—Special Hardened

Bethlehem (Pa.) Steel Co.

Foot Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.

Midvale Co., The, Nicetown, Phila., Pa.

ROOFING MATERIALS

Carey, Philip, Co., The, Cincinnati, Ohio.

ROOFING—Coal Tar Pitch

Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.

ROOFING—Special Copper Bearing Steel

Superior Sheet Steel Co., Canton, Ohio.

ROOFING—Steel Deck

Mahon, R. C. Co., Detroit, Mich.

ROOFING AND SIDING—Corrugated and Plain

American Rolling Mill Co., Middletown, O.

Carey, Philip, Co., The, Cincinnati, Ohio.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Johns-Manville Corp., 22 East 40th St., New York City.

Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.

ROOFING AND SIDING—Iron and Steel

Inland Steel Co., Chicago.

Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.

ROOFING & SIDING—(Zinc)—Corrugated & Plain

New Jersey Zinc Co., The, 160 Front St., N. Y. C.

RUBBER MOLDED PARTS

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

RUST PREVENTIVES

American Chemical Paint Co., Ambler, Pa.

Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS

Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING PROCESS

American Chemical Paint Co., Ambler, Pa.

Enterprise Galvanizing Co., Philadelphia.

Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

Southern Galvanizing Co., Baltimore, Md.

SAND BLAST EQUIPMENT & MACHINES

American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

Pangborn Corporation, Hagerstown, Md.

SAND BLAST STEEL SHOT

American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

Harrison Abrasive Corp., Manchester, N. H.

Pangborn Corporation, Hagerstown, Md.

Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT

Jeffrey Mfg. Co., The, Columbus, Ohio.

Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

SAWING MACHINES—Metal

Espen-Lucas Mch. Works, Phila.

SAWING MACHINES—Metal—Band

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

SAWS—Band and Hack for Metal

Armstrong-Blum Mfg. Co., Chicago.

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Circular, Rip & Cutoff

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

SAWS—Friction

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Hack Saw Blades

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Millers Falls Co., Greenfield, Mass.

SAWS—Hot Metal

Ajax Mfg. Co., The, Cleveland.

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Disston, Henry, & Sons, Inc., Philadelphia.

Tabor Mfg. Co., Philadelphia.

SAWS—Milling

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Screw Slotting

Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

Barber-Colman Co., Rockford, Ill.

Greenfield (Mass.) Tap & Die Corp.

SCALES

Streeter-Amet Co., Chicago.

Toledo (Ohio) Scale Co.

SCRAP BUNDLERS—See Presses—Baling

SCREENS—Perforated Metal

Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.

Diamond Mfg. Co., Wyoming, Pa.

Erdie Perforating Co., Rochester, N. Y.

Harrington & King Perforating Co., Chicago.

Hendrick Mfg. Co., Carbondale, Pa.

Mundt, Chas. & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire

Ludlow-Baylor Wire Co., St. Louis, Mo.

Wickwire Brothers, Cortland, N. Y.

Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

SCREW DRIVER BITS—Recessed Head Type

Aper Machine & Tool Co., The, Dayton, Ohio.

SCREW DRIVERS—Recessed Head Type

Aper Machine & Tool Co., The, Dayton, Ohio.

SCREW MACHINE PRODUCTS

Blake & Johnson Co., The, Waterville, Conn.

Commonwealth Brass Corp., Detroit.

Defiance Screw Machine Prods Div. of The Serrick Corp., Defiance, Ohio.

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Miles, Franklin S., 2422-28 N. Mather St., Phila., Pa.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H. Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.
R & L Tools, Philadelphia, Pa.
Shlmer, Samuel J., & Sons, Inc., Milton, Pa.
Waltham (Mass.) Watch Co.
SCREW MACHINERY—Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
SCREW MACHINERY—Hand
Warner & Swasey Co., The, Cleveland.
SCREW MACHINERY—Multiple Spindle
Acme Machine Tool Co., The, Cincinnati, Ohio.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.
SCREW PLATES
Greenfield (Mass.) Tap & Die Corp.
SCREW STOCK
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh, LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
SCREWS—Cap
Cleveland (Ohio) Cap Screw Co., The, Lamson & Sessions Co., The, Cleveland.
Mid-West Screw Products Co., 20 St. George St., St. Louis, Mo.
National Acme Co., The, Cleveland
Ottemiller, Wm. H. Co., Inc., York, Pa.
Trinlex Screw Co., Cleveland.
SCREWS—Coach or Lag
Lamson & Sessions Co., The, Cleveland.
SCREWS—For Sheet Metal
Parker-Kalon Corp., 200 Varick St., New York City.
SCREWS—Hardened Metallic Drive
Parker-Kalon Corp., 200 Varick St., New York City.
SCREWS—Locking
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
SCREWS—Machine
Blake & Johnson Co., The, Waterville, Conn.
Lamson & Sessions Co., The, Cleveland.
Progressive Mfg. Co., The, Torrington, Ct.
Shlmer, Samuel J., & Sons, Inc., Milton, Pa.
Trinlex Screw Co., Cleveland.
SCREWS—Machine, Recessed Head
American Screw Co., Providence, R. I.
SCREWS—Safety Set
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Standard Pressed Steel Co., Jenkintown, Pa.
SCREWS—Set
Cleveland (Ohio) Cap Screw Co., The, National Acme Co., The, Cleveland.
Ottemiller, Wm. H. Co., Inc., York, Pa.
SCREWS—Sheet Metal, Recessed Head
American Screw Co., Providence, R. I.
SCREWS, Socket Head Cap
Parker-Kalon Corp., 200 Varick St., N. Y. C.
Standard Pressed Steel Co., Jenkintown, Pa.
SCREWS—Wood, Recessed Head
American Screw Co., Providence, R. I.
SCREWS—Thread Cutting
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
SCRIBERS
Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.
SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.
SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N. Y.
SECOND-HAND MACHINERY—(See Clearing House Section)
SEPARATORS—Magnetic
Dings Magnetic Separator Co., 727 Smith St., Milwaukee.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.
SHAFTING—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.
SHAFTING—Steel
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
SHAFTING—Turned and Ground
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Kyperson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.
SHAFTS—Carbon Hard-surfaced
Foote Bros. Gear & Machine Co., 5301-H So. Western Blvd., Chicago, Ill.
SHAPER-PLANERS—Hydraulic
Rockford (Ill.) Machine Tool Co.
SHAPERS
Cincinnati (Ohio) Shaper Co., The, Ohio Machine Tool Co., Kenton, Ohio.
Smith & Mills Co., Cincinnati, Ohio.
SHAPERS—Hydraulic
Rockford (Ill.) Machine Tool Co.
SHAPERS—Vertical
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
SHAPERS—Vertical Hydraulic
Rockford (Ill.) Machine Tool Co.
SHAPES—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.
SHEAR BLADES & KNIVES
American Shear Knife Co., Homestead, Pa.
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Canton Fdry. & Mch. Co., Cleveland.
Cleveland (Ohio) Punch & Shear Works Co., The.
SHEARING MACHINES—Alligator
Canton Fdry. & Mch. Co., Cleveland.
SHEARING MACHINES—Angle, Hand and Power
Cleveland (Ohio) Punch & Shear Works Co., The.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
SHEARING MACHINES—Bar
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.
SHEARING MACHINES—Beam and Channel
Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.
SHEARING MACHINES—Billet
Morgan Engineering Co., The, Alliance, O.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.
SHEARING MACHINES—Continuous Sheet & Pack
Cleveland (Ohio) Punch & Shear Works Co., The.
SHEARING MACHINES—Plate
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.
SHEARING MACHINES—Sheet and Plate
Cincinnati (Ohio) Shaper Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
SHEARING MACHINES—Squaring
Cincinnati (Ohio) Shaper Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
SHEARING MACHINES—Up Cut
McKay Machine Co., The, Youngstown, Ohio.
SHEET BARS
Andrews Steel Co., The, Newport, Ky.
SHEET LIFTERS
Cullen-Friedeck Co., 1303 S. Kilbourn Ave., Chicago.
J-B Engineering Sales Co., 1738 Orange St., New Haven, Conn.
SHEET METAL MACHINERY
Bliss, E. W., Co., Brooklyn, N. Y.
Cincinnati (Ohio) Shaper Co., The, Cleveland (Ohio) Punch & Shear Works Co., The.
Drels & Krump Mfg. Co., Chicago.
Ferracute Machine Co., Bridgeton, New Jersey.
New Albany (Ind.) Mch. Mfg. Co., Niagara Mach. & Tool Wks., Buffalo, N. Y.
V & O Press Co., Hudson, N. Y.
Voss, Edward W., Pittsburgh, Pa.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.
SHEETS—Aluminum
Aluminum Co. of America, Pittsburgh.
SHEETS—Auto Body
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

PRODUCTS INDEX

SHEETS—Black

American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Granite City (Ill.) Steel Co.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

SHEETS—Blue Annealed

Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Worth Steel Co., Claymont, Del.

SHEETS—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze

American Brass Co., The, Waterbury, Conn.

SHEETS—Chrome

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Chrome Nickel

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Chromium Plated

American Nickeloid Co., 1312 Second St., Peru, Ill.

SHEETS—Coated

American Nickeloid Co., 1312 Second St., Peru, Ill.

SHEETS—Cold Rolled

American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Great Lakes Steel Corp., Ecorse, Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.

SHEETS—Copper Alloy

American Brass Co., The, Waterbury, Conn.

SHEETS—Copper Steel

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.

SHEETS—Electrical

American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.

SHEETS—Enameling

American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.

SHEETS—For Drawing and Stamping

American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Worth Steel Co., Claymont, Del.

SHEETS—Full Finished

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Galvanized, Flat and Corrugated

American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.
Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., The, Canton, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Galvannealed

Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.
Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Hot Rolled

Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Hot Rolled Pickled

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The Div. of The Andrews Steel Co.
Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Lead

National Lead Co., 111 Bdw., N. Y. C.

SHEETS—Long Terne

American Rolling Mill Co., Middletown, Ohio.

SHEETS—Magnesium Alloys

American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.

SHEETS—Metal Furniture

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Tin Mill Black

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Zinc

New Jersey Zinc Co., The, 160 Front St., N. Y. C.

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New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

SHOVELS—Gasoline

Marion (Ohio) Steam Shovel Co.

SHOVELS—Steam

Marion (Ohio) Steam Shovel Co.

SHOVELS—Mounted—See Cranes

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SINE BARS

Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

SLABS

Andrews Steel Co., The, Newport, Ky.

SLINGS—Wire Rope

Macwhyte Co., Kenosha, Wis.

Roebeling's, John A., Sons Co., Trenton, N. J.

SLITTERS—Gang

McKay Machine Co., The, Youngstown, Ohio.

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Rullard Co., The, Bridgeport, Conn.

Coulter, James, Machine Co., The, Bridgeport, Conn.

Eastern Tool & Mfg. Co., Bloomfield, N. J.

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Fig. 1434
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Fig. 200



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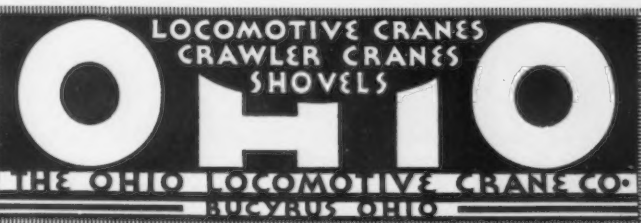
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Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Titchener, E. H. & Co., Binghamton, N. Y.
Torrington (Conn.) Mfg. Co., The.
Weatherly (Pa.) Foundry & Mfg. Co.
Waiting Corp., Harvey, Ill.
Wood, R. D. & Co., Philadelphia.

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Philadelphia (Pa.) Gear Works.
Poole Foundry & Mch. Co., Baltimore, Md.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E.
42nd St., N. Y. C.
New Jersey Zinc Co., The, 160 Front St.,
New York City.

SPIKES—Track
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.
Jones & Laughlin Steel Corp., Pittsburgh.

SPINDLES—Boring
Cincinnati Co., The, Dayton, Ohio.

SPINDLES—Grinding
EC-Cell Corp., 1210 Oakman Blvd., De-
troit, Mich.

SPINNINGS—Aluminum
American Aluminum Ware Co., 372 Jelliff
Ave., Newark, N. J.

SPLICE BARS
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.

SPRAY BOOTHS—Paint
Mahon, R. C. Co., Detroit, Mich.

SPRING MAKING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Torrington (Conn.) Mfg. Co., The.

SPRINGS—Coil
Miller & Van Winkle, Inc., 18 Bridge St.,
Brooklyn, N. Y.

**SPRINGS—Extension, Compression, Tor-
sion or Flat**
Amer. Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel
Corp. Subsidiary), Cleveland.
Barnes-Gibson-Raymond, Detroit Plant,
Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of The Asso-
ciated Spring Corp., Bristol, Conn.
Collins Supply & Equipment Co., Scrant-
on, Pa.
Cook Plant of Barnes-Gibson-Raymond,
Div. of Associated Spring Corp., Ann
Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Dunbar Bros. Co., Div. of Associated
Spring Corp., Bristol, Conn.
Hubbard, M. D., Spring Co., 351 Central
Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Lee Spring Co., Inc., 30 Main St., Brook-
lyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St.,
Brooklyn, N. Y.
Raymond Mfg. Co., Div. of Associated
Spring Corp., Cory, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.

SPROCKETS
Diamond Chain & Mfg. Co., Indianapolis,
Ind.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

STAMPINGS & DRAWINGS—Aluminum
American Aluminum Ware Co., 372 Jelliff
Ave., Newark, N. J.

STAMPINGS OR DRAWINGS—Metal
Adell Corp., Orange, Mass.
American Pulley Co., Pressed Steel Stamp-
ing Div., Philadelphia.
Barnes-Gibson-Raymond, Detroit Plant,
Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of The Asso-
ciated Spring Corp., Bristol, Conn.
Budd, Edward G., Mfg. Co., Phila., Pa.
Champion Sheet Metal Co., Inc., cor.
Squires & Duane Sts., Cortland, N. Y.
Cook Plant of Barnes-Gibson-Raymond,
Div. of Associated Spring Corp., Ann
Arbor, Mich.
Crosby Co., The, Buffalo, N. Y.
Dunbar Bros. Co., Div. of Associated
Spring Corp., Bristol, Conn.
Eastern Tool & Stpg. Co., Inc., Saugus,
Mass.
Flynn, Michael, Mfg. Co., Phila., Pa.
Hubbard, M. D., Spring Co., 351 Central
Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Lansing (Mich.) Stamping Co., So. Penn.
Ave.
Lee Spring Co., Inc., 30 Main St., Brook-
lyn, N. Y.
Metal Novelties Mfg. Co., Chicago, Ill.
Miller & Van Winkle, Inc., 18 Bridge
St., Brooklyn, N. Y.
New England Pressed Steel Co., Natick,
Mass.
Pach Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Div. of Associated
Spring Corp., Cory, Pa.
Schollhorn, Wm., Co., New Haven, Conn.
Sessions, J. H., & Son, Hooker Court,
Bristol, Conn.
Shakenproof Lock Washer Co., 2525 N.
Keeler Ave., Chicago.
Southern Products, Independence, Mo.

Stanley Works, The, New Britain, Conn.
Torrington (Conn.) Company
Transeau & Williams Steel Forging Corp.,
Alliance, Ohio.
Twin City Tool Co., Minneapolis, Minn.
Wagner Specialty Co., Burlington, Wisc.
Whitehead Stamping Co., 1669 W. Lafay-
ette Blvd., Detroit, Mich.
Worcester (Mass.) Pressed Steel Co., 104
Barber Ave.
Worcester (Mass.) Stamped Metal Co., 6
Hunt St.

STAMPS—Steel Alphabets and Figures
Cunningham, M. E. Co., Pittsburgh, Pa.

STAPLES—Wire
Wickwire Brothers, Cortland, N. Y.

STEEL—Aoid Reasting
Duriron Co., Inc., The, 438 N. Findlay
St., Dayton, Ohio.

STEEL—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Pitts-
burgh, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.
Crucible Steel Co. of America, Chrysler
Bldg., N. Y. C.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Div. Borg-Warner
Corp., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Birming-
ham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken
Roller Bearing Co., Canton, O.
Vanadium-Alloy Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge,
Mass.
Youngstown (Ohio) Sheet & Tube Co.
The.

STEEL—Alloy, Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge,
Mass.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Bright Finished
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp. (U. S. Steel
Corp. Subsidiary), Pittsburgh & Chi-
cago.
Crucible Steel Co. of America, Chrysler
Bldg., N. Y. C.
Ingersoll Steel & Disc Div. Borg-Warner
Corp., Chicago.

STEEL—Carbon Hard-surfaced
Foote Bros. Gear & Machine Co., 5301-H
So. Western Blvd., Chicago, Ill.

STEEL—Case Hardening
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
Monarch Steel Co., Indianapolis, Ind.

STEEL—Chrome Molybdenum
Crucible Steel Co. of America, Chrysler
Bldg., N. Y. C.

STEEL—Chrome Nickel
Crucible Steel Co. of America, Chrysler
Bldg., N. Y. C.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Div. Borg-Warner
Corp., Chicago.

STEEL—Cobalt
Darwin & Milner, Inc., Cleveland.

STEEL—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.;
Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel
Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Cold Rolled Strips
American Steel & Wire Co. (U. S. Steel
Corp. Subsidiary), Cleveland.
Bethlehem (Pa.) Steel Co.
Griffin Mfg. Co., Erie, Pa.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel
Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.;
Bridgeport, Conn.
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.
Superior Steel Corp., Carnegie, Pa.
Thomas Steel Co., The, Warren, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.
Worcester (Mass.) Pressed Steel Co., 104
Barber Ave.

**STEEL—Cold Rolled Strips—Electro Brass
Coated**
Thomas Steel Co., The, Warren, Ohio.

**STEEL—Cold Rolled Strips, Electro Cop-
per Coated**
Thomas Steel Co., The, Warren, Ohio.

**STEEL—Cold Rolled Strips, Electro-
Galvanized Coated**
Thomas Steel Co., The, Warren, Ohio.

PRESSES
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STEEL—Cold Rolled Strips, Electro Tite Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Zinc Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Stainless
Griffin Mfg. Co., Erie, Pa.

STEEL—Corrosion Resisting
Midvale Co., The, Nicetown, Phila., Pa.
Rustless Iron & Steel Corp., Baltimore, Md.
Superior Steel Corp., Carnegie, Pa.

STEEL—Crucible
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Jessop, Wm., & Son, Inc., 627-629 Sixth Ave., N. Y. C.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEEL—Die
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Disston, Henry, & Sons, Inc., Philadelphia.
Jessop, Wm., & Sons, Inc., 627-29 Sixth Ave., N. Y. C.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Drill
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Electric
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Disston, Henry, & Sons, Inc., Philadelphia.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—High Speed
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Cleveland (Ohio) Twist Drill Co., The, Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago.
Latrobe (Pa.) Electric Steel Co.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Ecorse, Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Republic Steel Corp., Cleveland, Ohio.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.
Steel & Tube Div. of Republic Steel Corp., Cleveland.
Superior Steel Corp., Carnegie, Pa.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Pittsburgh (Pa.) Steel Co.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Rustless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Griffin Mfg. Co., Erie, Pa.
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Div., Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Special Analysis
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Andrews Steel Co., The, Newport, Ky.
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Harrisburg (Pa.) Steel Corp.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Spring
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of The Associated Spring Corp., Bristol, Conn.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

STEEL—Stainless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., Middletown, O.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Rustless Iron & Steel Corp., Baltimore, Md.

Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Union Drawn Steel Div., Republic Steel Corp., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless Clad
Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago.

STEEL—Tool
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Bethlehem (Pa.) Steel Company.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Darwin & Milner, Inc., Cleveland.
Disston, Henry, & Sons, Inc., Philadelphia.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., Chicago.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., N. Y. C.
Midvale Co., The, Nicetown, Phila., Pa.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Tool, Cast To Shape
Detroit (Mich.) Alloy Steel Co.

STEEL MILL EQUIPMENT
Wellman Engineering Co., The, Cleveland

STEEL PLANTS AND ROLLING MILLS
Brassett, H. A., & Co., Chicago, Ill.

STEEL ROLLS
Continental Roll & Steel Foundry Co., East Chicago, Ind.
United Engineering & Fdry. Co., Pith.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Whiting Corp., Harvey, Ill.

STOP WATCHES
Stillman, M. J. Co., Inc. Chicago.

STOPPERS—Neoprene
Rhoades, R. W., Metalline Co., Inc., Long Island City, N. Y.

STOPPERS—Rubber
Rhoades, R. W., Metalline Co., Inc., Long Island City, N. Y.

STRAIGHT EDGES
Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

STRAIGHTENING AND DRAWING MACHINES—For Bars
Ajax Mfg. Co., The, Cleveland.

STRAIGHTENING MACHINES—Bar & Tube
Medart Co., The, St. Louis, Mo.

STRAIGHTENING MACHINES—Wire
Lewis Machine Co., 3455 E. 76th St., Cleveland.
Shuster, F. B., Co., The, New Haven, Conn.

STRAPPING CLIPS
Consumers Steel Products Co., Detroit, Mich.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Bethlehem (Pa.) Steel Co.
Mahon, R. G. Co., Detroit, Mich.
Morgan Engineering Co., The, Alliance, O.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

SUMPS—Roof
Mahon, R. G. Co., Detroit, Mich.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

SWAGING MACHINES
Torrington (Conn.) Company.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Pith.

TANK LININGS
Celcote Co., The, Cleveland, Ohio.
Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

TANK LININGS—Rubber
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Compressed Air, Gas, Oil and Water
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

TANKS—Iron and Steel
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

TANKS—Pickling
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

TANKS—Standards
Hauser-Stander Tank Co., Cincinnati, Ohio.
Harcor Corp., Newark, Delaware.

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Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

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TANKS—Rubber Lined
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Welded
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

National Tube Co. (U. S. Steel Corp. subsidiary), Pittsburgh.

TAPPING MACHINES
Baker Bros. Inc., Toledo, Ohio.

National Automatic Tool Co., Richmond, Ind.

Waterbury (Conn.) Farrel Fdry. & Mch. Co.

TAPPING MACHINES—Nuts
National Machinery Co., Tiffin, Ohio.

TAPS—Collapsing
Geometric Tool Co., The, New Haven, Conn.

Landis Mch. Co., Inc., Waynesboro, Pa.

Murphy Machine & Tool Co., Detroit.

National Acme Co., The, Cleveland.

TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.

Landis Mch. Co., Inc., Waynesboro, Pa.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

Victor Machinery Exchange, 251 Centre St., N. Y. C.

TEES—See Angles, Beams, Channels and Tees

TERMINALS—Plain & Lock
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.

Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago.

TERNE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. subsidiary), Pittsburgh & Chicago.

TESTING MACHINES—Hardness
Shore Instrument & Mfg. Co., Inc., The, Jamaica, L. I., N. Y.

TESTING MACHINES—Materials
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

THERMOMETERS
Weston Electrical Instrument Corp., Newark, N. J.

THERMOMETERS—recording
Brown Instrument Co., The, Philadelphia.

Leeds & Northrup Co., 4956 Stanton Ave., Philadelphia.

THREAD CUTTING TOOLS—See Dies, Taps

THREAD ROLLING MACHINES
Nilson, A. H. Mach. Co., Bridgeport, Ct.

Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

THREADING MACHINES
Eastern Mch. Screw Corp., New Haven, Conn.

Geometric Tool Co., The, New Haven, Conn.

Landis Mch. Co., Inc., Waynesboro, Pa.

Murphy Machine & Tool Co., Detroit.

National Machinery Co., Tiffin, Ohio.

THREADING MACHINES—Automatic
Landis Mch. Co., Inc., Waynesboro, Pa.

TIE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. subsidiary), Pittsburgh & Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

TIMING INSTRUMENTS
Stillman, M. J. Co., Inc., Chicago.

TIN PLATE
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. subsidiary), Pittsburgh & Chicago.

Granite City (Ill.) Steel Co.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Republic Steel Corp., Cleveland, Ohio.

Wellton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co., The.

TIN PLATE MACHINERY
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TIPS—Spot Welding
Mallory, P. R. & Co., Inc., Indianapolis, Ind.

TOOL BIT TIPS—Hard Carbide
McKenna Metals Co., Latrobe, Pa.

TOOL BITS
Carbidey Co., Inc., 11153 East 8-Mile Road, Detroit.

Gairing Tool Co., The, Detroit.

Gisholt Machine Co., Madison, Wisconsin.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.

Gairing Tool Co., The, Detroit.

Gisholt Machine Co., Madison, Wisconsin.

Williams, J. H. & Co., Buffalo, N. Y.

TOOLS—Hard Carbide Tipped
McKenna Metals Co., Latrobe, Pa.

TOOLS—Lathes
Armstrong Bros. Tool Co., Chicago.

Carbidey Co., Inc., 11153 East 8-Mile Road, Detroit.

Gisholt Machine Co., Madison, Wisconsin.

TOOLS—Metal Cutting
Carbidey Co., Inc., 11153 East 8-Mile Road, Detroit.

Greenfield (Mass.) Tap & Die Corp.

Michigan Tool Co., Detroit, Mich.

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

R & L Tools, Philadelphia, Pa.

TOOLS—Special
Ex-Coil-O Corp., 1210 Oakman Blvd., Detroit, Mich.

TOOLS—Steel Cutting
McKenna Metals Co., Latrobe, Pa.

TOOLS—Tungsten Carbide
Carbidey Co., Inc., 11153 East 8-Mile Road, Detroit.

TOOLS—Turning for Automatics
R & L Tools, Philadelphia, Pa.

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Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

Inde Air Products Company, The, 30 East 42nd St., N. Y. C.

TRACTORS AND TRAILERS—See Trucks, Tractors and Trailers—Industrial

TRACTORS—Industrial—See Trucks, Tractors and Trailers—Industrial

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Alvey-Ferguson Co., The, 700 Disney St., Cincinnati, Ohio.

Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Henschel & Co., 4401 W. National Ave., Milwaukee.

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Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

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Link-Belt Co., 2945 West Hunting Park Ave., Phila., Pa.

Reeves Pulley Co., Columbus, Indiana.

TRAPS—Steam
Crane Co., Chicago, Ill.

Nicholson, W. H. & Co., 165 Oregon St., Wilkes-Barre, Pa.

READS—Safety
Blaw-Knox Div. of Blaw-Knox Co., Pittsburgh.

Hendrick Mfg. Co., Carbondale, Pa.

Norton Co., Worcester, Mass.

TROLLEYS
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.

TRUCKS—Dumps (Industrial)
Clark Tractor Div. Clark Equipment Co., Battle Creek, Mich.

TRUCKS—Elevating (Power)
Automatic Transportation Co., 75 W. 87th St., Chicago, Ill.

Baker-Rauland Co., The, 2175 W. 25th St., Cleveland.

Clark Tractor Div. Clark Equipment Co., Battle Creek, Mich.

Elwell-Parker Electric Co., The, Cleveland.

Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Lift (Hand & Foot)
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Shop, Hand
Lausling (Mich.) Company.

TRUCKS, TRACTORS AND TRAILERS—Industrial
Atlas Car & Mfg. Co., The, Cleveland.

Automatic Transportation Co., 75 W. 87th St., Chicago, Ill.

Baker-Rauland Co., The, 2175 W. 25th St., Cleveland.

Clark Tractor Div. Clark Equipment Co., Battle Creek, Mich.

Elwell-Parker Electric Co., The, Cleveland.

Lausling (Mich.) Company.

Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TUBE MILL MACHINERY
Continental Roll & Steel Foundry Co., Industrial Equipment Div., East Chicago, Ind.

Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

Torrington (Conn.) Mfg. Co., The.

United Engineering & Fdry. Co., Ptgh. Waterbury (Conn.) Farrel Foundry & Machine Co., The.

TUBE MILL MACHINERY—Welded
Continental Roll & Steel Foundry Co., Industrial Equipment Div., East Chicago, Ind.

McKay Machine Co., The, Youngstown, Ohio.

TUBES—Boiler
Jones & Laughlin Steel Corp., Pittsburgh.

National Tube Co. (U. S. Steel Corp. subsidiary), Pittsburgh.

Pittsburgh (Pa.) Steel Co.

Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBES—Centrifugally Cast, Stainless
Duralloy Co., The, Scottsdale, Pa.

TUBES—Copper Alloy
American Brass Co., The, Waterbury, Conn.

PRODUCTS INDEX

TUBES—High Carbon
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBES—Nickel Silver
American Brass Co., The, Waterbury, Conn.

TUBES—Stainless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

TUBING—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

TUBING—Nichrome
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Open Seam
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.

TUBING—Seamless Steel
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.

Pittsburgh (Pa.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBING—Square and Rectangular
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Stainless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUBING—Tinned Brass or Copper
Bundy Tubing Co., Detroit, Mich.

TUBING—Tinned Steel
Bundy Tubing Co., Detroit, Mich.

TUBING—Welded Steel
Bundy Tubing Co., Detroit, Mich.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.

Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBULAR PRODUCTS
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

TUMBLING BARRELS—See Barrels—Tumbling

TUNGSTEN METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

TUNGSTEN CARBIDE
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

Firth-Stirling Steel Co., McKeesport, Pa.

TURBINE-GENERATORS—Steam
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TURNBUCKLES
Laughlin, Thomas, Co., The, Portland, Maine.

TURNING MACHINES—Bar & Tube
McCart Co., The, St. Louis, Mo.

TURNABLES
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

TURNABLES—Industrial
Canton Fdry. & Mch. Co., Cleveland.
Whiting Corp., Harvey, Ill.

TURNABLES—Twist Drills
Cleveland (Ohio) Twist Drill Co., The, Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

Victor Machinery Exchange, 251 Centre St., N. Y. C.

UNCOILERS—Processing
Cleveland (Ohio) Punch & Shear Works Co., The.

McKay Machine Co., The, Youngstown, Ohio.

UNIONS
Crane Co., Chicago.

UNIT HEATERS—Electric
American Foundry & Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

VALVES—Acid Resisting
Crane Co., Chicago, Ill.

Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
National Lead Co., 111 Bdway., N. Y. C.

VALVES—Air Blast for Presses
Littell, F. J., Mch. Co., Chicago.

VALVES—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia.
Crane Co., Chicago, Ill.

Hannifin Mfg. Co., Chicago, Ill.
Nicholson, W. H., & Co., 185 Oregon St., Wilkes-Barre, Pa.

Tomkins-Johnson Co., The, Jackson, Mich.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

VALVES—Gas, Water and Steam
Brown Instrument Co., The, Philadelphia.
Crane Co., Chicago.

Jarecki Mfg. Co., Erie, Pa.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

Wood, R. D., & Co., Philadelphia.

VALVES—Hydraulic
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

Birdsboro (Pa.) Steel Foundry & Machine Co.
Crane Co., Chicago.

Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.

VALVES—Proportioning
Brown Instrument Co., The, Philadelphia.

VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.

VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

VICES
Cincinnati (Ohio) Milling Mch. Co., The, Jarecki Mfg. Co., Erie, Pa.

WASHERS—Bevel Steel
Nickerson Plate Washer Co., Inc., Philadelphia.

WASHERS—Iron or Steel
Nictetown Plate Washer Co., Inc., Philadelphia.

Sessions, J. H., & Son, Hooker Court, Bristol, Conn.

Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.

Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

WASHERS—Lock
American Nut & Bolt Fastener Co., Pittsburgh.

Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.

Eaton Mfg. Co., Massillon, Ohio.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.

Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.

Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.

Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.

Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WASHERS—Special
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WASHERS—Spring
American Nut & Bolt Fastener Co., Pittsburgh.

Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.

Eaton Mfg. Co., Massillon, Ohio.
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.

National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.

Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.

Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.

Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.

Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

Washburn Co., The, Worcester, Mass.

WASHING MACHINES—Industrial
Alvey-Ferguson Co., The, 700 Disney St., Cincinnati, Ohio.

Mahon, R. C., Co., Detroit, Mich.

WATER COOLERS
Frigidaire Commercial and Air Conditioning Div. General Motors Sales Corp., Dayton, Ohio.

WELDED STEEL MACHINE FRAMES
Mahon, R. C., Co., Detroit, Mich.

WELDER CONTROL—For Spot, Butt & Projection Welding Machines
Electric Controller & Mfg. Co., The, Cleveland.

WELDING
Morrison Metalweld Process, Inc., 1436 Bailey Ave., Buffalo, N. Y.

WELDING—Electric
Federal Machine & Welder Co., Warren, Ohio.

Lincoln Electric Co., The, Cleveland.
Westinghouse Elec. & Mfg. Co., East Pgh.

WELDING—Thermit
Metal & Thermit Corp., 120 Broadway, N. Y. C.

WELDING CONTACTORS
Clark Controller Co., The, Cleveland.

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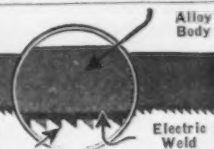
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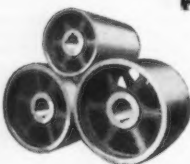
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PRODUCTS INDEX

WELDING FIXTURES

Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

WELDING MACHINES—Butt

Federal Machine & Welder Co., Warren, Ohio.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Swift Electric Welder Co., Detroit.

WELDING MACHINES—Electric Arc

General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Westinghouse Elec. & Mfg. Co., East Pith.

WELDING MACHINES—Electric Arc, Second-Hand. (See Clearing House Section)

WELDING MACHINES—Flash
Federal Machine & Welder Co., Warren, Ohio.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Swift Electric Welder Co., Detroit.

WELDING MACHINES—Press

Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.

WELDING MACHINES—Seam

Federal Machine & Welder Co., Warren, Ohio.

WELDING MACHINES—Spot

Federal Machine & Welder Co., Warren, Ohio.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Selacy Electric Resistance Welding Machines, Chicago, Ill.
Swift Electric Welder Co., Detroit.

WHEELBARROWS

Lansing (Mich.) Company.

WHEELS—Rolled Steel

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Standard Steel Wks. Co., Phila., Pa.

WHEELS—Seam Welding

Mallory, P. R., & Co., Inc., Indianapolis, Ind.

WIRE—Aluminum

Aluminum Co. of America, Pittsburgh.

WIRE—Barb

Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze

American Brass Co., The, Waterbury, Conn.

WIRE—Flat, Round, Square or Special Shapes

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Barnes, Wallace, Co., Div. of The Associated Spring Corp., Bristol, Conn.
Laclede Steel Co., St. Louis, Mo.

WIRE—Laughlin Steel Corp., Pittsburgh

Prentiss, Geo. W., & Co., Holyoke, Mass.
Roebbing's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Mattress

Roebbing's, John A., Sons Co., Trenton, N. J.

WIRE—Insulated

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
General Electric Co., Schenectady, N. Y.

WIRE—Netting

Roebbing's, John A., Sons Co., Trenton, N. J.

WIRE—Plane and Music

Webb Wire Works, New Brunswick, N. J.

WIRE—Rustless

Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Special Drawn Shapes

Rathbone, A. B. & J., Palmer, Mass.

WIRE—Spring

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Barnes, Wallace, Co., Div. of The Associated Spring Corp., Bristol, Conn.

WIRE—Stainless Steel

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

WIRE—Steel

Roebbing's, John A., Sons Co., Trenton, N. J.

WIRE—Spring (Music)

Webb Wire Works, New Brunswick, N. J.

WIRE—Stainless Steel

Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Steel

Bethlehem (Pa.) Steel Co.
Prentiss, Geo. W., & Co., Holyoke, Mass.

WIRE—Wire

Wickwire Brothers, Cortland, N. Y.

WIRE—Welding

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

WIRE—Wire

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Metal & Thermit Corp., 120 Broadway, N. Y. C.

WIRE—Zinc

Pittsburgh (Pa.) Steel Co.

Roebbing's, John A., Sons Co., Trenton, N. J.

Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

Wickwire Brothers, Cortland, N. Y.

Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE—Zinc

Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH

Buffalo (N. Y.) Wire Wks. Co., Inc.

Ludlow-Saylor Wire Co., St. Louis, Mo.

Roebbing's, John A., Sons Co., Trenton, N. J.

Wickwire Bros., Cortland, N. Y.

Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE DRAWING MACHINERY—See Wire Mill Machinery & Equip.

WIRE DRAWING, STRAIGHTENING & CUTTING MACHINERY

Ajax Mfg. Co., The, Cleveland.

WIRE FORMING MACHINERY

Ajax Mfg. Co., The, Cleveland.

Baird Mch. Co., The, Bridgeport, Conn.

Nilson, A. H., Mach. Co., Bridgeport, Ct.

WIRE MILL MACHINERY AND EQUIPMENT

Lewis Machine Co., The, 3455 E. 76th St., Cleveland, Ohio.

Morgan Construction Co., Worcester, Mass.

Shuster, F. B., Co., The, New Haven, Conn.

Torrington (Conn.) Mfg. Co., The.

Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

WIRE NAIL MACHINERY

National Machinery Co., Tiffin, Ohio.

WIRE PRODUCTS

American Spring & Mfg. Corp., Holly, Mich.

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.

Buffalo (N. Y.) Wire Wks. Co., Inc.

Eastern Tool & Mfg. Co., Bloomfield, N. J.

Hindley Mfg. Co., Valley Falls, R. I.

Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.

Jones & Laughlin Steel Corp., Pittsburgh.

Pittsburgh (Pa.) Steel Co.

U. S. Steel Wire Spring Co., Cleveland, O.

Wickwire Bros., Cortland, N. Y.

Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE PRODUCTS—Formed Wire

American Spring & Mfg. Corp., Holly, Mich.

Collins Supply & Equipment Co., Scranton, Pa.

Cuyahoga Spring Co., The, Cleveland.

Eastern Tool & Mfg. Co., Bloomfield, N. J.

Jeschke Wire & Specialty Co., 315 Industrial Ave., Crawfordsville, Ind.

Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

Parker Metal Goods Co., 20 Grafton St., Worcester, Mass.

Roebbing's, John A., Sons Co., Trenton, N. J.

Southern Products, Independence, Mo.

WIRE ROPE

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.

Bethlehem (Pa.) Steel Co.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Jones & Laughlin Steel Corp., Pittsburgh.

Leschen, A., & Sons Rope Co., St. Louis, Mo.

Macwhyrte Co., Kenosha, Wis.

Roebbing's, John A., Sons Co., Trenton, N. J.

Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE ROPE FITTINGS

Laughlin, Thomas, Co., The, Portland, Maine.

Macwhyrte Co., Kenosha, Wis.

Roebbing's, John A., Sons Co., Trenton, N. J.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic

Lewis Machine Co., The, 3455 E. 76th St., Cleveland.

Shuster, F. B., Co., The, New Haven, Ct.

WRENCHES

Armstrong Bros. Tool Co., Chicago.

Billings & Spencer Co., Hartford, Conn.

Williams, J. H., & Co., Buffalo, N. Y.

WRENCHES—Pipe

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Ushko, 135 Tonawanda St., Buffalo, N. Y.

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New Jersey Zinc Co., The, 160 Front St., New York City.

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10'4" Niagara, Arr. for M.D. Capacity 3/8"
10'6" Bertsch, M.D. Capacity #10 Gauge
12'6" Geo. A. Ohl, B.M.D. Capacity 3/8"

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10 ton Case	50'	Span.	220/3/60 A.C.
10 ton Northern	66'9"	Span.	220/3/60 A.C.
10 ton American	59'10"	Span.	220/3/60 A.C.
10 ton Champion	85'11"	Span.	440/3/60 A.C.
15 ton Shepard	51'6"	Span.	220 Volt D.C.
		3 ton Auxiliary	
15 ton Niles	61'	Span.	220/3/60 A.C.
15 ton Niles	70'	Span.	220 Volt D.C.
		5 ton Auxiliary	
20 ton Niles	70'	Span.	220 Volt D.C.
		5 ton Auxiliary	
20 ton Bedford	50'	Span.	220/3/60 A.C.
20 ton Morgan	56'	Span.	230 Volt D.C.
		5 ton Auxiliary	
20 ton Morgan	62'	Span.	230 Volt D.C.
		10 ton Auxiliary	
25 ton Niles	57'	Span.	230 Volt D.C.
		5 ton Auxiliary	
25 ton Shaw	59'8"	Span.	220/3/60 A.C.
		3 ton Auxiliary	

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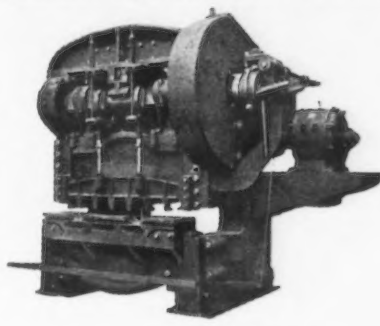
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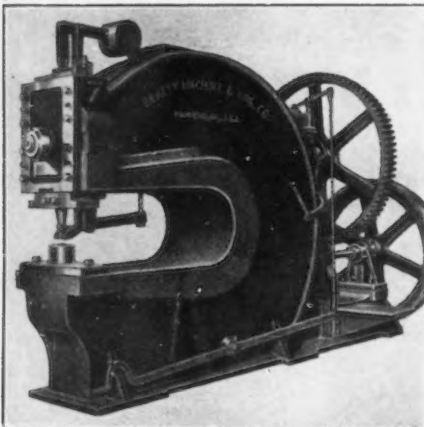
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- 3—3-TON HANNA.
- 2—75-TON ALLEN.
- 1—30-TON ALLEN.

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- 3—STYLE C BERWICK.

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- 7—No. 4A HIGH SPEED 1/4" to 7/16".
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- 1—No. 5 1/2 B HIGH SPEED 1/2" to 3/8".
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equal in its field.

ADDRESS BOX T-640
Care The Iron Age, 239 W. 39th St., New York

WANTED TO PURCHASE

ROLLING MILL, 18 or 20 inch
four high. 4½" to 5" power
driven work rolls.

Furnish full description and quote low-
est cash price.

ADDRESS BOX T-617

Care The Iron Age, 239 W. 39th St., New York

WANTED

**21-½ Bliss motor driven fly wheel
press**

**6 ft. Press Brake, motor driven,
12 gauge capacity — state age and
condition**

ADDRESS BOX T-644

Care The Iron Age, 239 W. 39th St., New York

WANTED:

**USED 8,000# to 10,000#
DROP FORGE HAMMER**
BOSTON IRON & METAL CO.
313 E. Baltimore St., Baltimore, Md.

WANTED

STAINLESS STEELS

ALL GRADES

SHEETS RODS STRIPS
TUBING

INDUSTRIAL STEEL CORP.

81 Polk Street, Newark, New Jersey

**MIDLAND STEEL & EQUIPMENT
COMPANY**

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**The
Largest Buyers
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Surplus Steel Inventories

**Tungsten-bearing Steel Scrap
Nickel-bearing Steel Scrap
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IRON & STEEL PRODUCTS, INC.

13496 S. Brainard Ave., Chicago, Ill.
"Anything containing IRON or STEEL"

Federal Works Agency, Public Buildings Ad-
ministration, Washington, D. C., Mar 12, 1940.

—Sealed proposals in duplicate will be publicly
opened in this office at 1 P. M., Standard Time,

April 16, 1940, for construction of the U. S. P. O.

at Westhampton Beach, N. Y. Upon application,

one set of drawings and specifications will be

supplied free to each general contractor inter-

ested in submitting a proposal. The above

drawings and specifications MUST be returned

to this office. Contractors requiring additional

sets may obtain them by purchase from this

office at a cost of \$5 per set, which will not be

returned. Checks offered as payment for draw-

ings and specifications must be made payable to

the order of the Treasurer, U. S. Drawings and

specifications will not be furnished to contractors

who have consistently failed to submit proposals.

One set upon request, and when considered in

the interests of the Government, will be fur-

nished, in the discretion of the Commissioner,

to builders' exchanges, chambers of commerce or

other organizations who will guarantee to make

them available for any sub-contractor or mate-

rial firm interested, and to quantity surveyors,

but this privilege will be withdrawn if the sets

are not returned after they have accomplished

their purpose. W. E. Reynolds, Commissioner

of Public Buildings, Federal Works Agency.

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SALARIED POSITIONS \$2,500 to \$25,000

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Contact employers for suitable positions through our confidential and effective methods. We negotiate all preliminary overtures. Established 25 years. Inquiries invited.

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EXECUTIVES \$2,400-\$25,000

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JIRA THAYER JENNINGS
Dept. C-9 CENTER STREET, NEW HAVEN, CONN.

HELP WANTED

WANTED—EXPERIENCED SALESMAN or representative for small bar, band and shape account in Detroit and State of Michigan. Give full details in first letter. All replies held in strict confidence. Address Box T-629, care *The Iron Age*, 239 W. 39th St., New York.

FOREMAN IN SMALL SHOP in Northern New Jersey. Structural Steel, Miscellaneous and Ornamental Iron worker. This is a steady position and we are only interested in a capable and experienced man. Salary will be commensurate with ability. State age and experience fully, also salary desired. Address Box T-626, care *The Iron Age*, 239 W. 39th St., New York.

WANTED SHOP SUPERINTENDENT or general foreman with manufacturer of electrical equipment and special machinery. Must be all around machinist with engineering training and be a producer. Plant is located in Detroit. This position pays up to \$4,000.00 per year. A future for the right man. Contract will be given on a yearly basis after proven ability. In reply state age, experience. Address Box T-651, care *The Iron Age*, 239 W. 39th St., New York.

HELP WANTED

WANTED SALESMAN—by old established warehouse. Must have experience selling Cold Finished Steel. Central States Territory. Address Box T-648, care *The Iron Age*, 239 W. 39th St., New York.

SALESMAN WANTED, living in Central or Western New York, with other lines, to sell forgings on commission basis in that territory and Northern Pennsylvania. Give full particulars. Address Box T-647, care *The Iron Age*, 239 W. 39th St., New York.

ACCOUNTS WANTED

EXPERIENCED SALES ENGINEER in Boston, Mass., wishes to represent and handle the account of manufacturer on commission basis. Address Box T-643, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

APPRENTICESHIP WANTED TO PAT-TERN-MAKER for Steel foundries. Four years of high school, five years' experience. A-1 references. Will furnish school record. Address Box T-640, care *The Iron Age*, 239 W. 39th St., New York.

OPEN HEARTH SUPERINTENDENT: An expert melter who knows how to get quality as well as high production. Over twenty years in the business and knows it thoroughly. Metallurgical training. Good organization man who uses sound methods in getting satisfactory results. It may be profitable for you to get in touch with me. Address Box T-641, care *The Iron Age*, 239 W. 39th St., New York.

OPERATING EXECUTIVE for steel company or steel foundry. Twenty years of successful experience in molding organizations into winning teams and making profits where there were none before. Your company, likewise, can obtain these satisfying results. An interview is invited. Address Box T-642, care *The Iron Age*, 239 W. 39th St., New York.

EXECUTIVE ENGINEER—Metallurgical, Executive and Sales assignments. Can install methods for production of plain and alloy high strength grey irons—cupola, air or electric furnace methods. Invites correspondence with progressive foundry. University graduate—18 years' industrial experience. Address Box T-639, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

DETROIT—CAN I SELL FOR YOU IN THIS AREA—I SHOULD LIKE DROP FORGING, STAMPING, DIE CASTING, OR CAST STEEL ON COMMISSION BASIS. ADDRESS BOX T-627, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

SITUATIONS WANTED

SUPERINTENDENT SEASONED EXPERIENCE COVERING management of machine shop, tool-room, sheet metal, press shop, foundry, etc., with record of results. Address Box T-625, care *The Iron Age*, 239 W. 39th St., New York.

STEEL COMPANY EXECUTIVE Seeks administrative position with steel or other industrial company having management problems or financial difficulties. Broad knowledge of steel and allied industry. Experienced in reorganizations, financing and securities. Address Box T-630, care *The Iron Age*, 239 W. 39th St., New York.

AVAILABLE—COMPETENT MANUFACTURING EXECUTIVE'S assistant; experienced production and organization trouble shooter; job and wage analysis; cost control. Age—32. College graduate. Ten years' electrical and automotive manufacturing background. Address Box T-634, care *The Iron Age*, 239 W. 39th St., New York.

HIGH CLASS WIDE EXPERIENCE directing sales, selling, sales promotion, public relations, some advertising. Good mixer, friend maker. Conference. Address Box T-605, care *The Iron Age*, 239 W. 39th St., New York.

EXECUTIVE UNIVERSITY EDUCATION Experience—industrial relations, manager of purchases, production, stores control, budgets. Now employed. Solicit interview. Address Box T-614, care *The Iron Age*, 239 W. 39th St., New York.

ROLLING MILL SUPERINTENDENT EXPERIENCED and progressive thorough training in roll design. Address Box T-618, care *The Iron Age*, 239 W. 39th St., New York.

PLANT EXECUTIVE by aggressive, dignified man with 20 years' varied experience in metal stampings and fabrication. Practical man with technical training. Capable of designing dies, tools, fixtures for modern production. Very successful installing wage incentive plans, handling help. Address Box T-633, care *The Iron Age*, 239 W. 39th St., New York.

FACTORY EXECUTIVE Technical graduate with proved ability in FACTORY MANAGEMENT, ability to handle men, to organize, to save money through better manufacturing methods and administration; knows sales problems; now employed; desires to become associated with an aggressive company. Address Box T-646, care *The Iron Age*, 239 W. 39th St., New York.

PERSONNEL MANAGER or ASSISTANT to BUSY executive. Forty-three years of age, mechanical engineer. Twenty years' executive experience in various capacities such as personnel, production control, shop management, plant layout and maintenance. Address Box T-645, care *The Iron Age*, 239 W. 39th St., New York.

WELDING—MECHANICAL ENGINEER—39. Seven years' supervisory experience ship, structural, tank, pipe fabrication. Cost analysis, economic and technical studies, coordination and planning, procedure, etc. Address Box T-652, care *The Iron Age*, 239 W. 39th St., New York.

Rates for Help, Employment Service, Representatives, Accounts and Situation Wanted Ads

These advertisements go to press on Friday for the following week's issue

Employment Service Rates
Help Wanted Rates
Representatives Wanted Rates
Accounts Wanted Rates
Set solid, 50 words or less.....\$5.00
Each additional word 10c
All capitals, 50 words or less.....\$6.50
Each additional word 13c
All capitals, loaded, 50 words or less.....\$7.50
Each additional word 15c

Situation Wanted Rates

Set solid, 25 words or less.....\$1.00
Each additional word 4c
All capitals, 25 words or less.....\$1.75
Each additional word 7c
All capitals, loaded, 25 words or less.....\$2.50
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COUNT SEVEN WORDS FOR KEYED ADDRESS

Display Advertising Rates Given on Request

DO NOT SEND cash through the mail. Use money order or check. ORIGINAL letters of recommendation in reply to advertisements—copies will serve the purpose. Letters forwarded without charge.

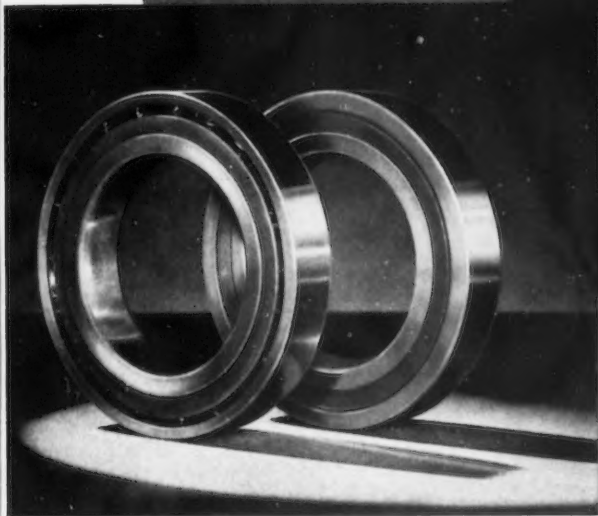
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HIGH SPEED AND FINE ACCURACY
with Forged Precision Bearings



Hardinge High Speed Precision
Second Operation Machine.



● Extreme accuracy is of little value in any machine unless it is built in as a permanent feature.

With New Departure, preloaded, precision ball bearings, Hardinge not only achieves fine accuracy that *endures*, but these free running ball bearings are never taxed in the least by the highest speeds for which the machine is intended. New Departure, Division of General Motors, Bristol, Connecticut.

2860

NEW DEPARTURE
THE FORGED STEEL BEARING

Magnetic Miracles

How you can make easy work of many "impossible" problems

If anyone says these are not miracles, let him look at the savings many industries are making by using Cutler-Hammer electro-magnetic devices. Let him see giant machines clutched and declutched smoothly at the touch of a remote button . . . or parts of machines started and stopped in automatic cycles. Or let him see huge stacks of freezing-cold, jagged scrap metal . . . or castings red hot from the mold . . . wafted about by a C-H Lifting Magnet. Such "miracles" pay handsome dividends to people who find ways to use them. Ask a Cutler-Hammer engineer about your problem. CUTLER-HAMMER, Inc., Pioneer Electrical Manufacturers, 1325 St. Paul Avenue, Milwaukee, Wisconsin.

Sort it

In many manufacturing processes, stray iron can cause much trouble. It can damage machines, demoralize production. It can contaminate chemicals, foodstuffs or many other substances in process. You may have any one of a dozen reasons for using a Cutler-Hammer Magnetic Separator. Why not discuss your problem with a qualified expert. Write for a Cutler-Hammer engineer.

BY THE BUILDERS OF

CUTLER-HAMMER

MOTOR CONTROL

C-H

Lift it

A Cutler-Hammer magnet does jobs in that formerly required Handles jagged scrap, rolls of hot steel, red hot castings, rails, wheels, bars, nails or steel parts in kegs, bags or Works equally well under blazing or in sub-zero ice. Is it the answer to your handling problem? Ask a Cutler-Hammer engineer for counsel.



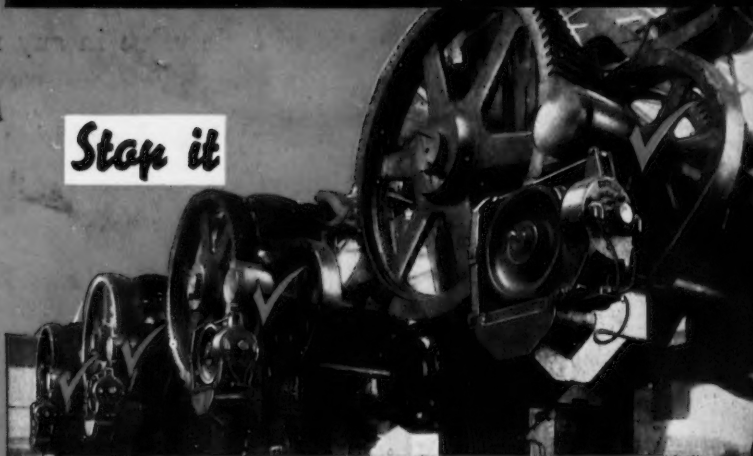
Control it

Many problems of machine performance find their answer in a Cutler-Hammer Magnetic Clutch. It provides every function of a mechanical clutch with many extra advantages. Definitely cushioned action. Control at any remote location or at any number of locations by simple relay and standard push button. Makes possible automatic operation in many machine designs where space limitations or a fixed speed relationship must be met. C-H Magnetic Clutches are made in a wide range of sizes. Consult a Cutler-Hammer engineer.



Stop it

When machine performance calls for quick stops, it's a job for Cutler-Hammer Magnetic Brakes. The action is smoothly cushioned magnetically, operation is positive and absolutely dependable, control by push button or any automatic contact arrangement. Passenger and freight elevators, huge traveling cranes are typical applications of Cutler-Hammer Magnetic Brakes. Do you have a "stop" problem? Let Cutler-Hammer work with you on its solution.



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